A HISTORY OF COMMERCIAL SOLVENTS CORPORATION

Commercial Solvents Corporation was born of intensive World War I research in explosives and earned distinction as the pioneer producer of acetone and butanol by fermentation processes. Though synthetic methods are now also employed by the company, it continues to be one of the foremost exponents of production by biological methods.

The Corporation has in the past decade pursued a policy of diversifying its products and broadening its markets by extending its activities into fields other than those of solvents and industrial alcohol. While much of the output is still marketed to industrial users, the company's anti-freezes, penicillin and other newer products reach the public under the firm's own label.

With the outbreak of war in 1914, a desperate shortage of acetone developed in Great Britain. The chemical was required as a solvent in gelatinizing nitroglycerin and guncotton to make cordite, then used by the British navy as a propellant for both cartridges and shells. Cordite made with defective acetone was blamed for the destruction of a British fleet off South America. In addition, acetone was required in large quantities as a solvent for nitrocellulose dopes used in finishing airplanes.

As acetone was then obtained almost entirely from the distillation of wood that had to be dried six months, a frantic search was launched for a quicker process. This led to the University of Manchester where Dr. Chaim Weizmann, a Russian-born chemistry professor was making butyl alcohol for an attempted synthesis of rubber. A bacterium had been found that fermented the starch of potatoes into butyl alcohol and produced acetone as a by-product. Later Dr. Weizmann developed a more efficient grain-feeding, spindle-shaped bacterium which was named Clostridium acetobutylicum Weizmann.

Cultures of this microorganism produced the required acetone at an unprecedented rate. The British government adopted the process and started production at plants in England, Canada and India. Dr. Weizmann refused personal honors from the British government but asked official aid for the Zionist cause in which he was keenly interested. As a consequence, according to Prime Minister Lloyd George's War Memoirs, the historic Balfour Declaration was issued in 1917. "His Majesty's Government view with favor," said this fateful document, "the establishment in Palestine of a national home for the Jewish people, and will use their best endeavors to facilitate the achievement of this object." Dr. Weizmann devoted to the Zionist movement, of which he has long been a leader, the large peacetime royalties which he later received under British and American patents.

After the United States entered the war, the U.S. Air Service and the British War Mission purchased the Commercial and Majestic whiskey distilleries on the Wabash River at Terre Haute, Indiana, and adapted them for acetone production by the Weizmann process. To manage the enterprise, the Joint War Board formed the Commercial Solvents Corporation of New York. Between May, 1918 and cessation of operations on Armistice Day, 1,500,000 gallons of acetone were produced along with twice this amount of butyl alcohol for which there was then no demand.

This history of Commercial Solvents Corporation was prepared for publication late in 1947 in Volume 6 of "American Chemical Industry", edited by Williams Haynes.

Two members of the British War Mission, William A. Burton and A. H. Wykeham-George interested a group of Americans in the commercial possibilities of the Weizmann process. These included David M. Goodrich and Henry Lockhart Jr., partners in a New York investment company; William D. Ticknor of the old Boston publishing family, and William S. Gray Sr., president of a chemical sales firm. Mr. Goodrich was the son of the founder of B.F. Goodrich Co. and later became Chairman of its Board. Mr. Lockhart, who had been head of the materials section of the War Department, knew of the uses of acetone for aircraft dopes.

With the advantages in mind of cheap and readily available raw materials, this group purchased the Terre Haute facilities from the government and acquired exclusive rights under the Weizmann patents for peacetime development of the war-born industry. Late in 1919 a new company, Commercial Solvents Corporation of Maryland, was incorporated. The first officers of this new company were: William D. Ticknor, President; William A. Burton, Vice President; and Philip G. Mumford, Treasurer. Within a few months Mr. Burton returned to England to look after the foreign interests of the new company. Mr. Ticknor became Chairman of the Board and Mr. Mumford, President.

As production was resumed in 1920, a series of events shifted interest from acetone to the hitherto useless butyl alcohol which had been stored in a huge tank. General Motors was seeking a faster method of finishing automobiles than by application of slow-drying varnishes. Edward M. Flaherty, a chemist of the duPont Company, discovered that a tough, quick-drying lacquer could be made by dissolving a low-viscosity, non-explosive nitrocellulose in suitable solvents along with gums and plasticizers. The principal solvent, however, was amyl acetate, which was made from fusel oil obtained as a by-product of the manufacture of whiskey. With the advent of prohibition, already limited fusel oil supplies shrank to practically nothing. Then it was found that butyl acetate and butyl alcohol could not only be substituted for amyl acetate in lacquers but that the butyls had definite advantages.

Commercial Solvents registered the name Butanol, which is now the accepted name for butyl alcohol. The content of the big butanol storage tank quickly found its way into the new, fast-drying lacquer which permitted automobiles to be finished, better than ever before, in assembly-line operations that required only minutes instead of days. In 1921, the company's orders for butanol greatly exceeded production.

Sales of solvents passed ten million pounds in 1922, but mysterious troubles with the bacteria developed near the end of the year and halted the company's prosperity while every lacquer manufacturer was pleading for more butanol. Contamination of the fermentation almost completely stopped production. The company's newly established research department spent months working out effective sterilization methods, and later a procedure was developed for immunizing the bacteria against infection. Meanwhile, to decentralize production and thus decrease the effect of a possible repetition of the catastrophe, a new and larger plant was started at Peoria, Illinois. It was rebuilt from one purchased from U.S. Food Products Corporation, situated on the Illinois River and convenient to corn, coal, water and transportation.

While making solvents, the butanol fermentation also produced hydrogen and carbon dioxide but C.S.C. for years allowed these gases to escape into the air. In 1926, as the company's first venture into high pressure, high temperature, catalytic synthesis, a plant was built at Peoria to turn these gases into ammonia. After a few months it was decided that it would be more profitable to produce synthetic methanol (wood alcohol). The switchover was effected simply by changing the porous catalyst through which the gases were forced at high temperature and pressure. Commercial Solvents in the summer of 1927 became the first U.S. company

to market synthetic methanol. To supplement the supply of gases from the fermentation, natural-gas lines were later connected to the Peoria plant. Excess carbon dioxide from the fermenters, not needed to make methanol, was converted to dry ice.

Stimulated by the competition of butanol made synthetically from petroleum, Commercial Solvents researchers in the early thirties developed a new strain of bacteria which fed on molasses that cost less than corn and was cheaper to process. This strain was named Clostridium saccharoaceto butylicum. Shortages of molasses during World War II forced a return to production from corn.

Some ethyl alcohol had always been made as a by-product of the Weizmann process and, with the repeal of prohibition, C.S.C. expanded in this direction. Barrel storage warehouses at Terre Haute, sold after World War I, were repurchased and distillation of bourbon and rye whiskies and neutral spirits for the blending of whiskey was started for bulk sale to bottlers and rectifiers.

In 1933, an important anti-freeze and industrial alcohol business together with additional alcohol producing facilities were acquired with purchase of the Rossville Commercial Alcohol Corp., and its subsidiary, the American Solvents and Chemical Corp. of California. The purchase gave Commercial Solvents distilleries at Harvey and Westwego, La., and at Agnew, Cal., with a capacity for making 45 million gallons of ethyl alcohol a year from molasses. In 1937, the industrial alcohol business, but not the plants, of the American Commercial Alcohol Corp., was purchased.

At this time, Commercial Solvents' line of anti-freezes was broadened to include NOR'WAY, an odor-free product compounded from methanol of which C.S.C. was an important producer. In 1941, a permanent-type glycol anti-freeze was added under the trade name of PEAK. A complete line of cooling system chemicals, cleaner, quick-flush, stop-leak and anti-rust, sold under the NOR'WAY brand were produced to round out the line. In 1946, a large new plant was completed at Terre Haute for the packaging of the NOR'WAY and PEAK anti-freezes and similar specialty products.

Since molasses was an important raw material in the manufacture of both butanol and ethyl alcohol, Commercial Solvents and Corn Products Refining Co. in 1935 formed the Commercial Molasses Corporation to buy the ships and terminals of the Molasses Products Corporation and the Dunbar Molasses Corporation. With these purchases were acquired ocean-going molasses tank ships, hundreds of tank-cars, and loading and docking facilities in Cuba, Puerto Rico, and the U.S. One of the tankers owned the company was sunk by a German submarine during World War II. Commercial Solvents had been associated with Corn Products Refining Co. in two other enterprises. In 1930, the two firms formed the Resinox Co. for the manufacture of phenol-formaldehyde resins and resin varnishes. In 1939, it was sold to Monsanto. Another venture with Corn Products was the British plant of Commercial Solvents, Ltd. built in 1935 at Bromborough, near Liverpool. This plant manufactured butanol, acetone, and ethyl alcohol. In 1938 it was sold to the United Molasses Company who shortly thereafter resold it to The Distillers Company, Ltd.

In 1929, C.S.C. acquired the Commercial Pigments Corp., which had been organized to make white pigment titanium dioxide from ilmenite ore obtained in Travancore, India. In 1931 it was merged with two duPont enterprises to form the Krebs Pigment & Color Corp. Commercial Solvents sold its stock in the latter to duPont in 1934.

The important new field of vitamin production was entered by Commercial Solvents as an unexpected consequence of its expansion in the alcohol and whiskey field. With the Terre Haute facilities devoted largely to production of whiskey

and spirits after the repeal of prohibition in 1933, butanol production from molasses was concentrated at Peoria and a million gallons of liquid fermentation wastes a day were run into the Illinois River. The Illinois Conservation Commission demanded that the company cease polluting the river.

This waste was a grave problem until Carl S. Miner, a consulting chemist who had aided the company on more than one occasion, suggested that the dried waste be analysed for vitamins. The fermentation residue was found to be rich in riboflavin, also known as Vitamin B_2 or G. Moreover it was found that fermented corn residues also contained riboflavin in only slightly lower concentration than those from molasses.

A process for salvaging the vitamin was worked out and promptly patented. In 1938 Commercial Solvents began production of riboflavin supplements for use by manufacturers in poultry and livestock feeds; riboflavin is essential to fast growth and productivity in many animals. These supplements are marketed under the trade names of B.Y, containing 500 micrograms of riboflavin per gram, and B.Y-21, with 8,000 micrograms per gram.

Subsequently a new process was developed and installed at Terre Haute for the production of large quantities of pure crystalline riboflavin by deep-vat fermentation. Production from these sources was such that the price of crystalline riboflavin was reduced from $12 per gram in 1939 to 15¢ per gram in 1945. In 1946, Terre Haute's riboflavin plant and Peoria's vitamin feed recovery facilities were further expanded.

In the middle thirties, high pressure synthesis activities of Commercial Solvents were expanded by development of the nitroparaffin process which utilizes natural gas. Dr. Henry B. Hass, head of the chemistry department at Purdue University, undertook to combine the hydrocarbons of natural gas with nitric acid to make a new family of aliphatic nitrohydrocarbons and their derivatives. When Commercial Solvents heard of the work of Dr. Hass, it quickly obtained rights to his patents from the Purdue Research Foundation. Dr. Hass was employed as an adviser and several of his graduate students were added to the company's research staff. From the four basic nitroparaffins obtained by the nitration of propane (nitromethane, nitroethane, 1-nitropropane, and 2-nitropropane), more than a thousand products were made in the laboratory. In 1940, an oversized pilot plant went into operation at Peoria to make sixteen of these products as a beginning. These quickly found uses in nearly every branch of the chemical and allied industries. Expansion of the nitroparaffin development was retarded during World War II, but work on the processes was resumed in '46.

Another interest of C.S.C. involving natural gas has been the Thermatomic Carbon Co., which at Sterlington, Louisiana, cracks natural gas in special furnaces to make fine grades of carbon black. In 1931, C.S.C. assumed management of Thermatomic on a contract basis and in 1938 acquired a majority interest in it. The carbon black goes into rubber, both natural and synthetic, expecially to make heat-resistant tires, inner tubes and mechanical rubber goods. In 1944, this subsidiary enlarged its carbon plant to meet the requirements of the war synthetic rubber program.

Because of the success of C.S.C. with gas operations, the Army Ordnance Department in World War II asked the company to construct and operate a plant for the making of anhydrous ammonia. This was required in tremendous quantity for many military purposes. The company located the new plant adjacent to the Thermatomic operation at Sterlington because of the availability of natural gas and rail facilities. This ammonia plant, known as the Dixie Ordnance Works, has a rated capacity of 150 tons per day. After the war, Commercial Solvents purchased Dixie Ordnance

Works from the government and rechristened it the Dixie Chemical Division of Commercial Solvents Corporation. The plant was reconditioned and operating at rated capacity shortly before the end of 1946. One of the units that had not been completed for the ammonia process was redesigned and equipment installed for the production of synthetic methanol.

Penicillin was another novel but logical World War II expansion for Commercial Solvents. The pharmaceutical field was entirely new to the company but its 25 years experience in the technique of large-scale fermentations made the step a natural one.

After the Department of Agriculture's research laboratory in Peoria had discovered that corn steep-liquor would yield many times the amount of penicillin produced by other media, Commercial Solvents became interested in the new vitally needed drug and in 1943, the company built in record time a large penicillin plant at Terre Haute.

A special type of penicillin mold was found to produce penicillin as prolifically when submerged in an agitated steep-liquor mixture as when on a quiet surface. Together the two discoveries meant that penicillin might be produced in large tanks much as butanol and acetone had been made for many years by Commercial Solvents. Up to that time all penicillin had been produced in necessarily small quantities from surface culture in bottles. A deep fermentation plant was designed with a rated monthly capacity of 40 billion Oxford units of the drug. Beginning in August, 1943, laboratory work, pilot-plant development and full-scale construction were carried on simultaneously. The plant got under way the last of January, 1944--in less than nine months there was accomplished what normally would have required two or three years.

Since that time, Commercial Solvents' penicillin production has increased enormously, until in December, 1946, the plant was producing over 500billion units of penicillin per month. Just as the company was among the first to produce penicillin in quantity by deep-fermentation, it also was the first to produce commercially pure crystalline salts of penicillin. Also with mounting production rates came economies which enabled Commercial Solvents to reduce prices steadily. Although the drug was sold by surface-culture producers in 1943 for $20 per 100.000 units, the company was able to sell its products for $3.20 per 100,000 units even in 1944. Prices were steadily reduced until in December, 1946 only $0.42 was being charged.

In 1946, C.S.C. began erection of a plant for the manufacture on a commercial scale of a new and potent insecticide--benzene hexachloride--another product with little chemical relationship to products previously made. This insecticide, for which an excellent process was developed in the company's laboratories, constitutes a logical addition to its products. It is being marketed under the name of C.S.C. Benzene Hexachloride.

Another 1946 expansion was the acquisition of the Pennsylvania Alcohol & Chemical Company and its 47-acre plant at Carlstadt, N.J., which produces alcohols, solvents, clear-base nitrocellulose solutions and pharmaceuticals. The purchase increased Commercial Solvents' production and distribution facilities on the Eastern seaboard and is being operated as an independent division.

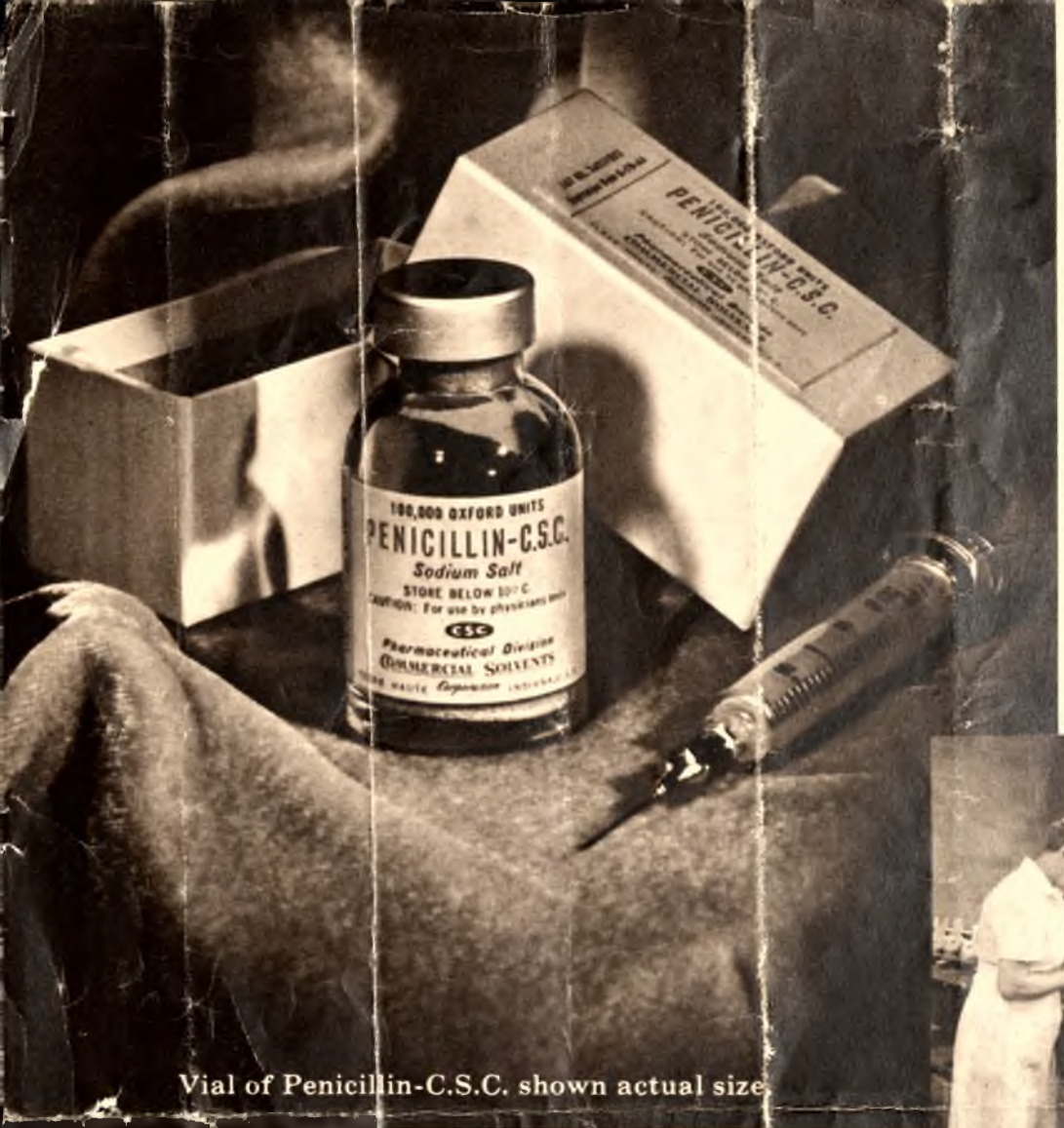
Addition of the Carlstadt property increased to ten the plants owned and operated by Commercial Solvents. Others are located in Terre Haute, Indiana (3); Peoria, Illinois; Sterlington (2), Harvey and Westwego, Louisiana; and Agnew, Calif.

The management is headed by Major Theodore Penfield Walker, who in 1938 succeeded Mr. Ticknor as President after his death. The latter had added this office to his duties as Board Chariman when Mr. Mumford resigned in 1928 to head another company. Other officers are: Henry E. Perry, Executive Vice President; Henry W. Denny, Vice President in Charge of Sales; Kenneth H. Hoover, Vice President in Charge of Research; Maynard C. Wheeler, Vice President in Charge of Production; M. B. Jasspon, Vice President in Charge of Beverage Sales; Howard L. Sanders, Treasurer; Anthony H. Braun, Controller; and A. R. Bergen, Secretary. General offices are at 17 East 42nd Street, New York 17, N.Y.

In addition to its own research staff, headed by Vice President Hoover; Thomas S. Carswell, Manager, Research and Development; and Dr. Jerome Martin, Director of Research; Commercial Solvents has a Research Advisory Council composed of outside consultants. Carl S. Miner, who aided in the vitamin development, is chairman. The group includes Dr. Henry B. Hass, Prof. R. Norris Shreve and Prof. W. Conard Fernelius, all of Purdue University; Dr. Charles DeWitt Hurd, Northwestern University; Dr. Jervis Fulmer, DePauw University; Dr. Walter C. O'Kane, University of New Hampshire; Dr. David R. Goddard, University of Pennsylvania; Dr. Jesse L. Riebsomer, University of New Mexico; and Prof. Milton C. Kloetzel, University of California. The company's bacteriological and chemical research and development activities center in a modern glass-brick research laboratory completed at Terre Haute in 1941 to replace a structure destroyed by fire.

BIBLIOGRAPHY

An authorized history of Commercial Solvents Corporation, titled "One Thing Leads to Another," by Fred C. Kelly was published by Houghton Mifflin in 1936. The company was the subject of a Fortune Magazine article by Thomas Mahoney in October, 1944. A detailed account of Dr. Chaim Weizmann's development of the culture bearing his name was recorded in "This Chemical Age" by Williams Haynes published by Alfred Knopf in 1942. The Weizmann process was charted and described by D.H. Killefer in Industrial and Engineering Chemistry for January, 1927, and in numerous other technical journals.



Vial of Penicillin-C.S.C. shown actual size

Penicillin-C.S.C. is stored below 10° C. in order to safeguard its potency. For administration, the yellow powder is usually dissolved in physiological saline solution. Each vial supplies enough Penicillin-C.S.C. for several doses, depending upon the infection to be treated. In many infectious diseases penicillin has proved more advantageous than any other treatment. Such diseases include certain types of pneumonia, meningitis, gas gangrene, osteomyelitis, and other wound infections, as well as the more prevalent venereal diseases.

Rabbits are lined up in stanchions for the pyrogen tests. They are not injured, the same rabbits being used several times.

The mice in these bottles are alive—breathing through a hole in the tip of the bottle. They are being inoculated with penicillin for toxicity tests.

In cages such as these are housed 1,000 New Zealand White rabbits and 2,000 white mice.

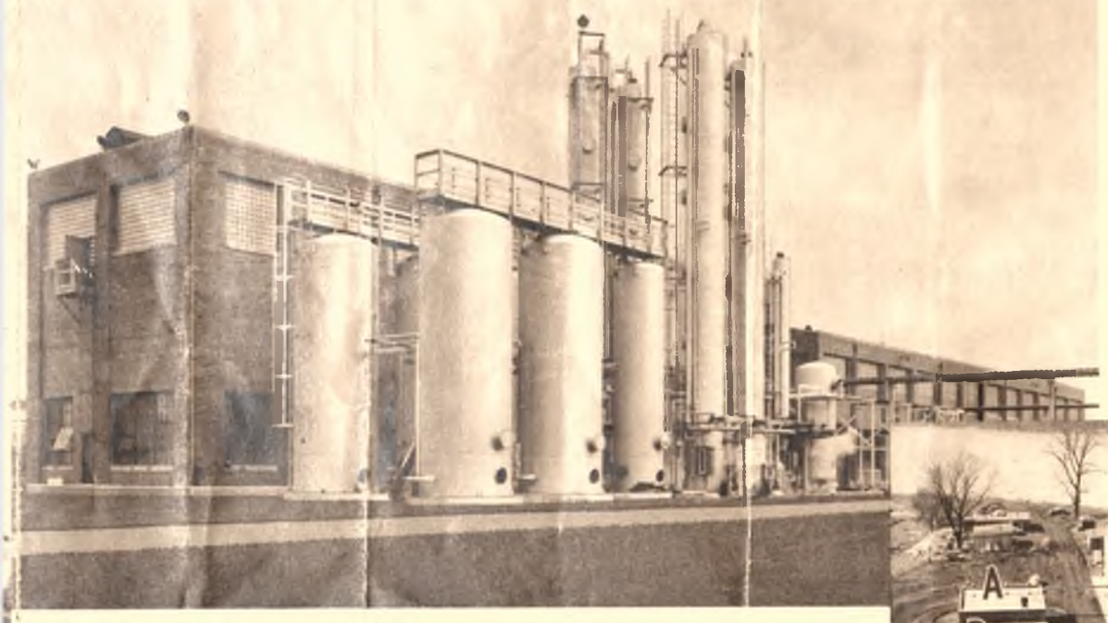
Commercial Solvents maintains a large, fully air-conditioned animal house, with specially bred rabbits and mice.

CSC

COMMERCIAL SOLVENTS

17 East 42nd Street *Corporation* New York 17, N. Y.

From blueprint to mass production in six months . . . *the remarkable story of* PENICILLIN - C.S.C.



Commercial Solvents penicillin plant was specially engineered by E. B. Badger & Sons Co.

View of the CSC penicillin plant showing: A—compressor building; B—storage building; C—air-conditioned animal house; D—main production building.

SEE BACK PAGE

When the curative properties of penicillin were recognized, the government called for huge quantities of this life-saving substance for use by our armed forces . . . quantities far exceeding the output possible with previously known methods.

A quarter-century's experience with microbiological processes enabled Commercial Solvents to bring Penicillin-C.S.C. into mass production in an incredibly short time. The special plant shown above—located at Terre Haute, Indiana—was designed, built, and placed in successful operation in less than six months.

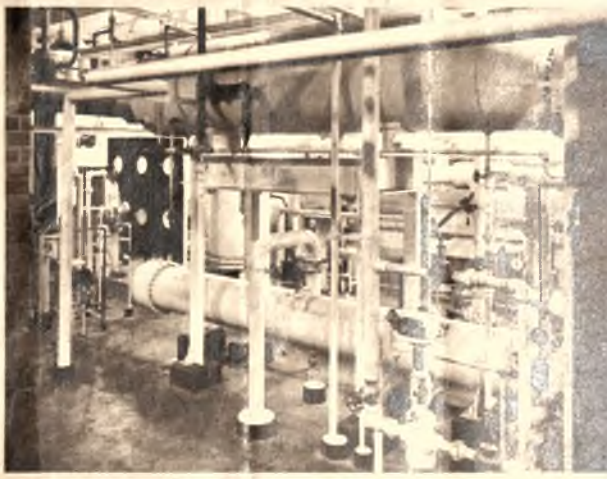
The capacity of the CSC penicillin plant is conservatively rated at 40,000,000,000 (forty billion) Oxford Units per month . . . or twice the amount of penicillin produced in the United States during the entire year 1943.

Workers in the sterile area must use the precautions of a surgeon preparing for an operation. They wear eye shades to protect against eye burns from ultra-violet lamps.

Five laboratories control every step in the production of Penicillin-C.S.C. Above is the Assay Laboratory which determines potency.

How Modern Production the Output of

1 Fermentation tanks where the mold (*Penicillium notatum*) is grown by the new "deep culture process." A battery of these three-story-high tanks is in constant use.



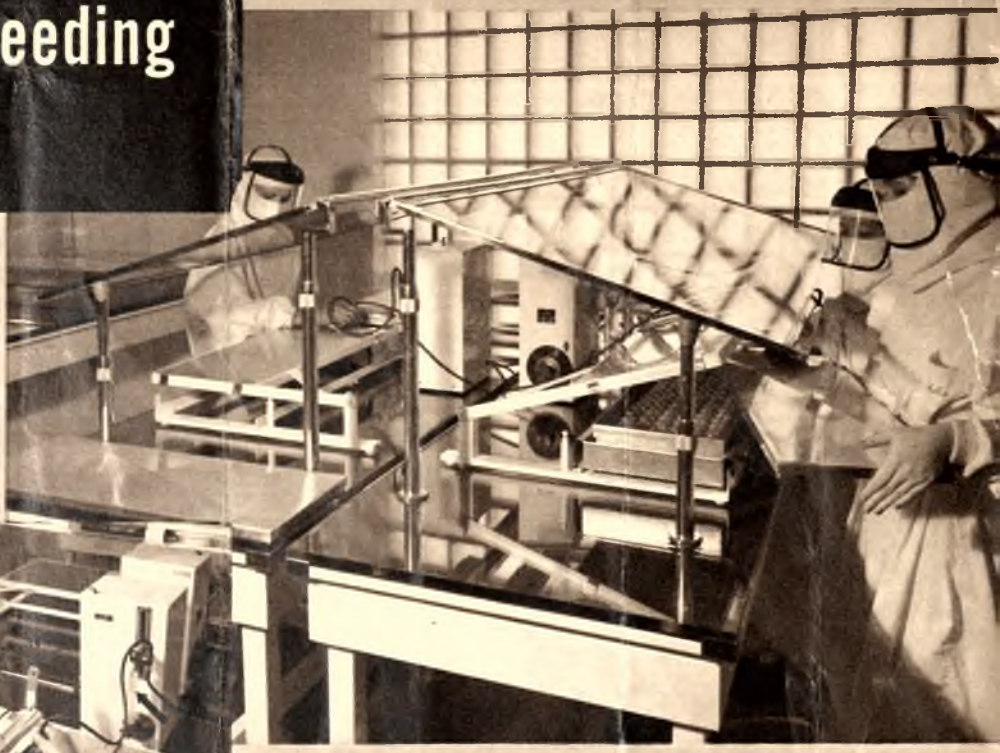
2 The penicillin, generated in the culture liquor, is concentrated in a solvent with this equipment.

3 With high speed supercentrifuges, emulsions of water and solvent are separated preparatory to treatment with chemicals. Penicillin is supplied as a sodium salt.

4 The 20-gallon bulk container (before operator) holds all the concentrated penicillin solution obtained from one of the huge fermentation tanks, which after drying will yield approximately 4.0—5.5 pounds of dry product.

5 Vials in which Penicillin-C.S.C. is packed are washed and sterilized.

Methods are Speeding PENICILLIN-C.S.C.



6 This is how the concentrated solution of Penicillin-C.S.C. is placed in vials. Inset (below) shows a closeup of the filling operation, with arrow pointing to the metering pump which delivers a quantity (predetermined by potency) which is measured accurately to 5/100ths of a cubic centimeter.

7 Worker placing a tray of vials in the deep-freeze chamber. Room temperature is kept at freezing—hence workers must dress warmly.

8 Vials containing frozen penicillin solution are placed in these dehydrators, where a high vacuum removes moisture, leaving the penicillin salt as a dry yellow powder in the bottom of each vial.

9 Last room in the sterile area, where rubber stoppers are placed in the vials, which are then sealed with aluminum caps.

10 Packaging is an assembly line operation. All Penicillin-C.S.C. now produced is under strict government allocation . . . but as soon as military needs have been met, Penicillin-C.S.C. will become available for civilian medical practice.

HISTORY OF COMMERCIAL SOLVENTS CORPORATION

1919 to 1959

During World War I two fermentation and distillation plants in Terre Haute, Indiana were acquired by the United States and British Governments for the production of acetone for the manufacture of explosives. The process used was developed in England by Dr. Chaim Weizmann and involved the fermentation of grain by bacteria. In addition to acetone, the fermentation also produced butyl and ethyl alcohol as by-products.

Following the war, Commercial Solvents Corporation was organized in 1919 and acquired the facilities at Terre Haute primarily to produce and develop markets for the high-quality acetone manufactured by the Weizmann process. In its early development, the Corporation found itself with increasing quantities of butyl alcohol for which there were very limited markets until it was discovered that this product and its derivatives were prime solvents for the production of fast-drying nitro cellulose lacquers.

This discovery made possible the rapid expansion of the nitro cellulose lacquers industry, and due to the lacquer's quality and fast drying characteristics, was a potent factor in speeding up the production line manufacture in the automotive industry. ~~The rapid~~ THE RAPID increase in demand for butyl solvents called for expanded production, and in 1923 the Peoria, Illinois, Plant was built with a capacity approximately equal to the Terre Haute production. In 1927 the capacity of the Peoria Plant was doubled.

In June 1927, production of synthetic methanol was started at Peoria using waste fermentation gasses as raw material. Later natural gas was substituted as raw material.

In 1931 Commercial Solvents assumed management of the Thermatomic Carbon Company

and subsequently acquired a controlling interest in its capital stock which is still owned. Thermatomic Carbon produces carbon black by cracking natural gas. Its production is used principally in the manufacture of automobile tires and tubes and other rubber products. The Thermatomic Carbon Company plant is located in Sterlington, Louisiana, adjacent to that of Commercial Solvents Corporation.

In 1933 by acquisition of all capital stock of the Rossville Commercial Alcohol Corporation, three plants equipped to produce industrial alcohol from molasses were obtained. Two of these plants located in Louisiana at Harvey and Westwego were owned by Rossville and the third at Agnew, California, was owned by its subsidiary, the American Solvents and Chemical Corporation.

During the late 1930's after extensive research and pilot plant work, a process for the production of nitroparaffins was developed by the vapor phase reaction of nitric acid and certain of the hydrocarbons obtainable from natural gas or petroleum. A semi-commercial plant for the production of nitroparaffins and their derivatives was put in operation at Peoria in 1940.

As a result of the World War II demand for explosives and munitions, several plants for the production of anhydrous ammonia by synthesis of natural gas were built by the Government. One of these plants, completed in 1943, was erected at Sterlington, Louisiana, under the supervision of Commercial Solvents Corporation and was operated by the Corporation until the close of hostilities. In 1946 this plant was purchased by Commercial Solvents, and in 1948 a large addition to the plant was made for the production of methanol and put into operation.

To furnish diversification of products and to stabilize the demand for production of anhydrous ammonia, units for oxidation of ammonia to nitric acid and for the production of nitrogen solutions were installed in 1951.

During 1953 installation of additional facilities at the Sterlington Plant have more than doubled anhydrous ammonia and methanol production. A plant for the production of

solid ammonium nitrate by a new process developed by our own Research and Development Department was completed.

Our knowledge of fermentation processes and the urgent need for large quantities of penicillin led us into the production of antibiotics and other pharmaceuticals. In 1944 a new plant for the production of penicillin was completed and subsequently capacity was substantially increased. Commercial Solvents introduced a new antibiotic--Bacitracin--in 1948 in new facilities provided. Operation of this plant is almost completely instrument controlled and has been so arranged that in conjunction with the penicillin plant, the two can be used for the production of a diversity of antibiotics.

In 1946 the business and assets of the Pennsylvania Alcohol and Chemical Company were purchased from the National Sugar Refining Company. This purchase included a plant located at Carlstadt, New Jersey.

During the same year a completely modern plant for blending and packaging automotive specialties comprising anti-freeze and allied products was completed at Terre Haute, Indiana.

To provide adequate facilities for Research and Development called for by expanding operations of the Corporation, additional laboratories and pilot plants were provided in 1948 at a cost of about $2,000,000.

In 1952 a plant for the production of "Expandex," a plasma volume expander containing 6 per cent dextran was completed and put into operation at Terre Haute, Indiana. Expandex is used in the treatment of shock due to hemorrhage, burns, trauma, or surgical procedures.

In 1955 production of a new antibiotic--Cycloserine-- was started at our Terre Haute Plant. This antibiotic is produced in the facilities used for penicillin and bacitracin. Also

during 1955 a multimillion dollar plant for large-scale production of the nitroparaffins was erected at Sterlington, Louisiana. This class of compounds is finding wide use in the solvent and special chemicals field.

In 1957 a $2,000,000 expansion of the methylamines production unit was completed at the Terre Haute Plant. This very modern plant includes the latest in automatic control.

PLANTS:

The executive offices of the Corporation are in New York City. There are ~~six~~ FIVE plants located at Terre Haute, Indiana; [redacted] Sterlington, Louisiana; Harvey, Louisiana; Agnew, California; and Newark, New Jersey. These are divided into the Central Division including Terre Haute, [redacted] and Newark; the Southern Division made up of the Sterlington and Harvey Plants; the Western Division at the Agnew Plant.

The Terre Haute Plant actually comprises three plants all located in or near the city of Terre Haute. Plant No. 1 is located on about 41 acres of land on which are most of the manufacturing, shipping, and storage facilities, and the Research and Engineering Departments serving the entire Corporation. Plant No. 2 is four blocks south of Plant No. 1 on 19 acres of land, on which are bonded warehouses and facilities for pharmaceutical packaging, storing, and shipping. Plant No. 3, situated on approximately 37 acres of land, is used for the formulation, storage, and shipment of anti-freeze and automotive specialties.

In the above plants, the principal products manufactured include Penicillin, Bacitracin, Riboflavin, Dextran, etc.

Sterlington, Louisiana, is located in Ouachita Parish about 15 miles north of Monroe, a city of 38,000. Anhydrous ammonia, methanol, nitrogen solutions, and nitric acid are produced on a 138-acre tract, and the solid ammonium nitrate plant, together with storage and shipping facilities, is located about four miles south on a 2,200-acre holding.

The Harvey Plant is located on the Mississippi River south of New Orleans on a 24-acre tract. It comprises equipment for fermentation of molasses, together with storage and shipping facilities to handle industrial alcohol and other chemicals for shipment by rail, barge, or coastwise steamers.

The Peoria, Illinois, Plant is located on a tract of 56 acres on the navigable Illinois River, and is equipped for the production of butyl and ethyl alcohols, acetone, nitroparaffins, animal food supplements, etc.

Our California Plant is located at Agnew about 40 miles from San Francisco on a 35-acre tract. Principal products are industrial alcohol, acetic acid, formaldehyde, and pentaerythritol.

Our Newark, New Jersey, Plant is located on 1.5 acres of land and is used for denaturing, storage, and shipment of industrial alcohol and for storage and shipment of our pharmaceutical products.

A HISTORY OF COMMERCIAL SOLVENTS CORPORATION

Commercial Solvents Corporation was born of intensive World War I research in explosives and earned distinction as the pioneer producer of acetone and butanol by fermentation processes. Though synthetic methods are now also employed by the company, it continues to be one of the foremost exponents of production by biological methods.

The Corporation has in the past decade pursued a policy of diversifying its products and broadening its markets by extending its activities into fields other than those of solvents and industrial alcohol. While much of the output is still marketed to industrial users, the company's anti-freezes, penicillin and other newer products reach the public under the firm's own label.

With the outbreak of war in 1914, a desperate shortage of acetone developed in Great Britain. The chemical was required as a solvent in gelatinizing nitroglycerin and guncotton to make cordite, then used by the British navy as a propellant for both cartridges and shells. Cordite made with defective acetone was blamed for the destruction of a British fleet off South America. In addition, acetone was required in large quantities as a solvent for nitrocellulose dopes used in finishing airplanes.

As acetone was then obtained almost entirely from the distillation of wood that had to be dried six months, a frantic search was launched for a quicker process. This led to the University of Manchester where Dr. Chaim Weizmann, a Russion-born chemistry professor was making butyl alcohol for an attempted synthesis of rubber. A bacterium had been found that fermented the starch of

---

This history of Commercial Solvents Corporation was prepared for publication late in 1947 in Volume 6 of "American Chemical Industry", edited by Williams Haynes.

potatoes into butyl alcohol and produced acetone as a by-product. Later Dr. Weizmann developed a more efficient grain-feeding, spindle-shaped bacterium which was named Clostridium acetobutylicum Weizmann.

Cultures of this microorganism produced the required acetone at an unprecedented rate. The British government adopted the process and started production at plants in England, Canada and India. Dr. Weizmann refused personal honors from the British government but asked official aid for the Zionist cause in which he was keenly interested. As a consequence, according to Prime Minister Lloyd George's War Memoirs, the historic Balfour Declaration was issued in 1917. "His Majesty's Government view with favor," said this fateful document, "the establishment in Palestine of a national home for the Jewish people, and will use their best endeavors to facilitate the achievement of this object." Dr. Weizmann devoted to the Zionist movement, of which he has long been a leader, the large peacetime royalties which he later received under British and American patents.

After the United States entered the war, the U. S. Air Service and the British War Mission purchased the Commercial and Majestic whiskey distilleries on the Wabash River at Terre Haute, Indiana, and adapted them for acetone production by the Weizmann process. To manage the enterprise, the Joint War Board formed the Commercial Solvents Corporation of New York. Between May, 1918 and cessation of operations on Armistice Day, 1,500,000 gallons of acetone were produced along with twice this amount of butyl alcohol for which there was then no demand.

Two members of the British War Mission, William A. Burton and A. H. Wykeham-George interested a group of Americans in the commercial possibilities of the Weizmann process. These included David M. Goodrich and Henry Lockhart Jr., partners in a New York investment company; William D. Ticknor of the old Boston publishing family, and William S. Gray Sr., president of a chemical sales firm. Mr. Goodrich was the son of the founder of B. F. Goodrich Co. and later became Chairman of its Board. Mr. Lockhart, who had been head of the materials section of the War Department, knew of the uses of acetone for aircraft dopes.

With the advantages in mind of cheap and readily available raw materials, this group purchased the Terre Haute facilities from the government and acquired exclusive rights under the Weizmann patents for peacetime development of the war-born industry. Late in 1919 a new company, Commercial Solvents Corporation of Maryland, was incorporated. The first officers of this new company were: William D. Ticknor, President; William A. Burton, Vice President; and Philip G. Mumford, Treasurer. Within a few months Mr. Burton returned to England to look after the foreign interests of the new company. Mr. Ticknor became Chairman of the Board and Mr. Mumford, President.

As production was resumed in 1920, a series of events shifted interest from acetone to the hitherto useless butyl alcohol which had been stored in a huge tank. General Motors was seeking a faster method of finishing automobiles than by application of slow-drying varnishes. Edward M. Flaherty, a chemist of the du Pont Company, discovered that a tough, quick-drying lacquer could be made by dissolving a low-viscosity, non-explosive nitrocellulose in suitable solvents along with gums and plasticizers. The principal solvent, however, was amyl acetate, which was made from fusel oil obtained as a by-product of the manufacture of whiskey. With the advent of prohibition, already limited fusel oil supplies shrank to practically nothing. Then it was found that butyl acetate and butyl alcohol could not only be substituted for amyl acetate in lacquers but that the butyls had definite advantages.

Commercial Solvents registered the name Butanol, which is now the accepted name for butyl alcohol. The content of the big butanol storage tank quickly found its way into the new, fast-drying lacquer which permitted automobiles to be finished, better than ever before, in assembly-line operations that required only minutes instead of days. In 1921, the company's orders for butanol greatly exceeded production.

Sales of solvents passed ten million pounds in 1922, but mysterious troubles with the bacteria developed near the end of the year and halted the company's prosperity while every lacquer manufacturer was pleading for more butanol. Contamination of the fermentation almost completely stopped production. The company's newly established research department spent months working out effective sterilization methods, and later a procedure was developed for immunizing the bacteria against infection. Meanwhile, to decentralize production and thus decrease the effect of a possible repetition of the catastrophe, a new and

larger plant was started at Peoria, Illinois. It was rebuilt from one purchased from U. S. Food Products Corporation, situated on the Illinois River and convenient to corn, coal, water and transportation.

While making solvents, the butanol fermentation also produced hydrogen and carbon dioxide but C.S.C. for years allowed these gases to escape into the air. In 1926, as the company's first venture into high pressure, high temperature, catalytic synthesis, a plant was built at Peoria to turn these gases into ammonia. After a few months it was decided that it would be more profitable to produce synthetic methanol (wood alcohol). The switchover was effected simply by changing the porous catalyst through which the gases were forced at high temperature and pressure. Commercial Solvents in the summer of 1927 became the first U. S. company to market synthetic methanol. To supplement the supply of gases from the fermentation, natural-gas lines were later connected to the Peoria plant. Excess carbon dioxide from the fermenters, not needed to make menthanol, was converted to dry ice.

Stimulated by the competition of butanol made synthetically from petroleum, Commercial Solvents researchers in the early thirties developed a new strain of bacteria which fed on molasses that cost less than corn and was cheaper to process. This strain was named Clostridium saccharoaceto butylicum. Shortages of molasses during World War II forced a return to production from corn.

Some ethyl alcohol had always been made as a by-product of the Weizmann process and, with the repeal of prohibition, C.S.C. expanded in this direction. Barrel storage warehouses at Terre Haute, sold after World War I, were repurchased and distillation of bourbon and rye whiskies and neutral spirits for the blending of whiskey was started for bulk sale to bottlers and rectifiers.

In 1933, an important anti-freeze and industrial alcohol business together with additional alcohol producing facilities were acquired with purchase of the Rossville Commercial Alcohol Corp., and its subsidiary, the American Solvents and Chemical Corp. of California. The purchase gave Commercial Solvents distilleries at Harvey and Westwego, La., and at Agnew, Cal., with a capacity for making 45 million gallons of ethyl alcohol a year from molasses. In 1937, the industrial alcohol business, but not the plants, of the American Commercial Alcohol Corp., was purchased.

At this time, Commercial Solvents' line of anti-freezes was broadened to include NOR'WAY, an odor-free product compounded from methanol of which C.S.C. was an important producer. In 1941, a permanent-type glycol anti-freeze was added under the trade name of PEAK. A complete line of cooling system chemicals, cleaner, quick-flush, stop-leak and anti-rust, sold under the NOR'WAY brand were produced to round out the line. In 1946, a large new plant was completed at Terre Haute for the packaging of the NOR'WAY and PEAK anti-freezes and similar specialty products.

Since molasses was an important raw material in the manufacture of both butanol and ethyl alcohol, Commercial Solvents and Corn Products Refining Co. in 1935 formed the Commercial Molasses Corporation to buy the ships and terminals of the Molasses Products Corporation and the Dunbar Molasses Corporation. With these purchases were acquired ocean-going molasses tank ships, hundreds of tank-cars, and loading and docking facilities in Cuba, Puerto Rico, and the U.S. One of the tankers owned by the company was sunk by a German submarine during World War II. Commercial Solvents had been associated with Corn Products Refining Co. in two other enterprises. In 1930, the two firms formed the Resinox Co. for the manufacture of phenol-formaldehyde resins and resin varnishes. In 1939, it was sold to Monsanto. Another venture with Corn Products was the British plant of Commercial Solvents, Ltd. built in 1935 at Bromborough, near Liverpool. This plant manufactured butanol, acetone, and ethyl alcohol. In 1938 it was sold to the United Molasses Company who shortly thereafter resold it to The Distillers Company, Ltd.

In 1929, C.S.C. acquired the Commercial Pigments Corp., which had been organized to make white pigment titanium dioxide from ilmenite ore obtained in Travancore, India. In 1931 it was merged with two du Pont enterprises to form the Krebs Pigment & Color Corp. Commercial Solvents sold its stock in the latter to du Pont in 1934.

The important new field of vitamin production was entered by Commercial Solvents as an unexpected consequence of its expansion in the alcohol and whiskey field. With the Terre Haute facilities devoted largely to production of whiskey and spirits after the repeal of prohibition in 1933, butanol production from molasses was concentrated at Peoria and a million gallons of liquid fermentation wastes a day were run into the Illinois River. The Illinois Conservation Commission demanded that the company cease polluting the river.

This waste was a grave problem until Carl S. Miner, a consulting chemist who had aided the company on more than one occasion, suggested that the dried waste be analysed for vitamins. The fermentation residue was found to be rich in riboflavin, also known as Vitamin B_2 or G. Moreover it was found that fermented corn residues also contained riboflavin in only slightly lower concentration than those from molasses.

A process for salvaging the vitamin was worked out and promptly patented. In 1938 Commercial Solvents began production of riboflavin supplements for use by manufacturers in poultry and livestock feeds; riboflavin is essential to fast growth and productivity in many animals. These supplements are marketed under the trade names of B.Y, containing 500 micrograms of riboflavin per gram, and B.Y-21, with 8,000 micrograms per gram.

Subsequently a new process was developed and installed at Terre Haute for the production of large quantities of pure crystalline riboflavin by deep-vat fermentation. Production from these sources was such that the price of crystalline riboflavin was reduced from $12 per gram in 1939 to 15 cents per gram in 1945. In 1946, Terre Haute's riboflavin plant and Peoria's vitamin feed recovery facilities were further expanded.

In the middle thirties, high pressure synthesis activities of Commercial Solvents were expanded by development of the nitroparaffin process which utilizes natural gas. Dr. Henry B. Hass, head of the chemistry department at Purdue University, undertook to combine the hydrocarbons of natural gas with nitric acid to make a new family of aliphatic nitrohydrocarbons and their derivatives. When Commercial Solvents heard of the work of Dr. Hass, it quickly obtained rights to his patents from the Purdue Research Foundation. Dr. Hass was employed as an adviser and several of his graduate students were added to the company's research staff. From the four basic nitroparaffins obtained by the nitration of propane (nitromethane, nitroethane, 1-nitropropane, and 2-nitropropane), more than a thousand products were made in the laboratory. In 1940, an oversized pilot plant went into operation at Peoria to make sixteen of these products as a beginning. These quickly found uses in nearly every branch of the chemical and allied industries. Expansion of the nitroparaffin development was retarded during World War II, but work on the processes was resumed in 1946.

Another interest of C.S.C. involving natural gas has been the Thermatomic Carbon Co., which at Sterlington, Louisiana, cracks natural gas in special furnaces to make

fine grades of carbon black. In 1931, C.S.C. assumed management of Thermatomic on a contract basis and in 1938 acquired a majority interest in it. The carbon black goes into rubber, both natural and synthetic, especially to make heat-resistant tires, inner tubes and mechanical rubber goods. In 1944, this subsidiary enlarged its carbon plant to meet the requirements of the war synthetic rubber program.

Because of the success of C.S.C with gas operations, the Army Ordnance Department in World War II asked the company to construct and operate a plant for the making of anhydrous ammonia. This was required in tremendous quantity for many military purposes. The company located the new plant adjacent to the Thermatomic operation at Sterlington because of the availability of natural gas and rail facilities. This ammonia plant, known as the Dixie Ordnance Works, has a rated capacity of 150 tons per day. After the war, Commercial Solvents purchased Dixie Ordnance Works from the government and rechristened it the Dixie Chemical Division of Commercial Solvents Corporation. The plant was reconditioned and operating at rated capacity shortly before the end of 1946. One of the units that had not been completed for the ammonia process was redesigned and equipment installed for the production of synthetic methanol.

Penicillin was another novel but logical World War II expansion for Commercial Solvents. The pharmaceutical field was entirely new to the company but its 25 years experience in the technique of large-scale fermentations made the step a natural one.

After the Department of Agriculture's research laboratory in Peoria had discovered that corn steep-liquor would yield many times the amount of penicillin produced by other media, Commercial Solvents became interested in the new vitally needed drug and in 1943, the company built in record time a large penicillin plant at Terre Haute.

A special type of penicillin mold was found to produce penicillin as prolifically when submerged in an agitated steep-liquor mixture as when on a quiet surface. Together the two discoveries meant that penicillin might be produced in large tanks much as butanol and acetone had been made for many years by Commercial Solvents. Up to that time all penicillin had been produced in necessarily small quantities from surface culture in bottles. A deep fermentation plant was designed with a rated monthly capacity of 40 billion Oxford units of the drug. Beginning in August, 1943, laboratory work, pilot-plant develop-

ment, and full-scale construction were carried on simultaneously. The plant got under way the last of January, 1944--in less than nine months there was accomplished what normally would have required two or three years.

Since that time, Commercial Solvents' penicillin production has increased enormously, until in December, 1946, the plant was producing over 500 billion units of penicillin per month. Just as the company was among the first to produce penicillin in quantity by deep-fermentation, it also was the first to produce commercially pure crystalline salts of penicillin. Also with mounting production rates came economies which enabled Commercial Solvents to reduce prices steadily. Although the drug was sold by surface-culture producers in 1943 for $20 per 100,000 units, the company was able to sell its products for $3.20 per 100,000 units even in 1944. Prices were steadily reduced until in December, 1946 only $0.42 was being charged.

In 1946, C.S.C.began erection of a plant for the manufacture on a commercial scale of a new and potent insecticide--benzene hexachloride--another product with little chemical relationship to products previously made. This insecticide, for which an excellent process was developed in the company's laboratories, constitutes a logical addition to its products. It is being marketed under the name of C.S.C.Benzene Hexachloride.

Another 1946 expansion was the acquisition of the Pennsylvania Alcohol & Chemical Company and its 47-acre plant at Carlstadt, N.J., which produces alcohols, solvents, clear-base nitrocellulose solutions and pharmaceuticals. The purchase increased Commercial Solvents' production and distribution facilities on the Eastern seaboard and is being operated as an independent division.

Addition of the Carlstadt property increased to ten the plants owned and operated by Commercial Solvents. Others are located in Terre Haute, Indiana (3); Peoria, Illinois; Sterlington (2), Harvey and Westwego, Louisiana; and Agnew, California.

The management is headed by Major Theodore Penfield Walker, who in 1938 succeeded Mr. Ticknor as President after his death. The latter had added this office to his duties as Board Chairman when Mr. Mumford resigned in 1928 to head another company. Other officers are: Henry E. Perry, Executive Vice President; Henry W. Denny, Vice President in Charge of Sales; Kenneth H. Hoover, Vice President in Charge of Research; Maynard C. Wheeler, Vice President in Charge of Production; M. B. Jasspon,

Vice President in Charge of Beverage Sales; Howard L. Sanders, Treasurer; Anthony H. Braun, Controller; and A. R. Bergen, Secretary. General offices are at 17 East 42nd Street, New York 17, N. Y.

In addition to its own research staff, headed by Vice President Hoover; Thomas S. Carswell, Manager, Research and Development; and Dr. Jerome Martin, Director of Research; Commercial Solvents has a Research Advisory Council composed of outside consultants. Carl S. Miner, who aided in the vitamin development, is chairman. The group includes Dr. Henry B. Hass, Prof. R. Norris Shreve and Prof. W. Conard Fernelius, all of Purdue University; Dr. Charles DeWitt Hurd, Northwestern University; Dr. Jervis Fulmer, DePauw University; Dr. Walter C. O'Kane, University of New Hampshire; Dr. David R. Goddard, University of Pennsylvania; Dr. Jesse L. Riebsomer, University of New Mexico; and Prof. Milton C. Kloetzel, University of California. The company's bacteriological and chemical research and development activities center in a modern glass-brick research laboratory completed at Terre Haute in 1941 to replace a structure destroyed by fire.

BIBLIOGRAPHY

An authorized history of Commercial Solvents Corporation, titled "One Thing Leads to Another," by Fred C. Kelly was published by Houghton Mifflin in 1936. The company was the subject of a Fortune Magazine article by Thomas Mahoney in October, 1944. A detailed account of Dr. Chaim Weizmann's development of the culture bearing his name was recorded in "This Chemical Age" by Williams Haynes published by Alfred Knopf in 1942. The Weizmann process was charted and described by D.H. Killefer in Industrial and Engineering Chemistry for January, 1927, and in numerous other technical journals.

HISTORY

The Terre Haute IMC facility got its start during World War I when the British needing acetone bought a distillery to produce the acetone butanol ethanol (ABE). Following World War I a group of New York investors purchased the facility and named it Commercial Solvents Corporation. The prime product then shifted to butanol as it was used to prepare quick drying lacquers. This solvent continued in high usage through the depression years. In the early 1930s Purdue University developed the nitroparaffins. The rights to this process were secured and in excess of 500 patents were issued based on the products imitating from nitric acid and propane being brought together under pressure. The Nitroparaffin Division was sold to Alberta Natural Gas (Angus), however, several derivatives of the nitroparaffins are still produced at the Terre Haute facilities for Angus. The Research Department has been extremely vital to the Terre Haute facility as at the beginning of World War II penicillin was first crystallized in the Research Department here. Immediately following World War II Baciferm® a registered trademark (bacitracin zinc) became a vital antibiotic to the animal feeding industry. It not only has therapeutic value but increases animal growth rates.

CSC entered the chemical industry by producing ammonia and methanol from their own gas fields and a methylamine plant (ammonia plus methanol) was built here and continues in

in operation today. The methylamines are building blocks for choline chloride (produced here as an essential amino acid for the animal feed industry) and sold to the other industrial companies for producing pesticides, herbicides, and as a spinning solvent for synthetic fibers.

In the mid 1960s Purdue University discovered a Gibberella mold of which demonstrated slight estrogenic effects. The rights were obtained to this mold and from this mold the Research Department discovered Ralgro® (zeranol) a cattle implant which is our primary product here at Terre Haute.

The Terre Haute facility has had a long and interesting history of which is basically producing the products discovered in our own Research Department. Many of these products have had a 10 to 20 year life and thus our continuing dependency to Research is most vital to our existence. In May of 1975 IMC purchased CSC and has continued this vital dedication to Research.

This facility presently has approximately 1,600,000 hours without a lost time incident.

08-03-84
) Batts

E. Lee Webb, Director
Terre Haute Operations

Mr. Webb has a rural southern Illinois background. He attended Southern Illinois University and joined CSC in 1951. He has been Plant Manager at three locations (Peoria, Illinois; Sterlington, Louisiana (Thermatomic Carbon; and the Terre Haute facility since 1973).

He is active in local community activities - presently serving as President of the Greater Terre Haute Area Chamber of Commerce and Goodwill Industries of the Wabash Vally. Other community activities include Board of Directors of Indiana Manufacturers Association, Civil Defense, Vigo County Fair, Wabash Valley Boy Scouts, Junior Achievement, and the Terre Haute Rotary Club.

Dr. Thomas B. MacRury
Director of Research

Dr. Thomas B. MacRury received his Ph.D. in Physical Chemistry in 1969 from the University of British Columbia. He then moved to the United States to do post-doctoral research at Florida State University and Pennsylvania State University. In 1974 he went to work for Union Carbide Corporation in Charleston, West Virginia. After working for Union Carbide for six years in the area of polymer chemistry and physics, he joined International Minerals & Chemical Corporation in 1981 as the Director of Analytical and Macromolecular Research. In 1983 he was promoted to Director of Research. Currently he is responsible for the following departments in the Research and Development Division: the Life Sciences Department, the Chemistry Department, and the Research Services Department.

ROBERT W. HILL
Vice President & Director
Marketing Planning & Technical Support

Mr. Hill grew up on a farm in west central Missouri. He received a B.S. in Animal Husbandry from the University of Missouri-Columbia and an M.S. in Animal Nutrition from Texas A&M University.

Mr. Hill joined CSC's Animal Health and Nutrition Department as a salesman in 1970. In 1974, he was promoted to the newly created position of South Central District Supervisor.

In 1976, Mr. Hill was named Regional Sales Manager when CSC was purchased by IMC. In 1978, he was promoted to Field Sales Manager and in 1980, Mr. Hill was promoted to Director of Domestic Sales and in 1982, named Director of Domestic Sales & Marketing.

Recently, Mr. Hill was named Vice President & Director of Marketing Planning and Technical Support for the Veterinary Products Division.

ROBERT R. RAILSBACK
Vice President & Director
Sales

Mr. Railsback is a native of Iowa. He joined CSC's Animal Nutrition Sales Department in 1968 as a salesman. In 1973, Mr. Railsback was promoted to Eastern Sales Supervisor.

In 1976, Mr. Railsback was named Regional Sales Manager when CSC was purchsed by IMC. In 1978, he was promoted to Field Sales Manager and in 1980, he was promoted to Manager of International Market Development. In 1981, Mr. Railsback was named Director of Marketing Planning & Development. In 1982, he was named Director of International Sales & Marketing.

Recently, Mr. Railsback was named Vice President & Director of Sales for the Veterinary Products Division.

8/25/50

COMMERCIAL SOLVENTS CORPORATION

Early in World War I, the British Fleet had suffered a miserable defeat by the Germans off the coast of Chile because the shells they were using plopped harmlessly into the water. The reason for this was the poor quality of acetone being used as a solvent in making the high explosives. In those days, acetone was obtained by the distillation of wood - a lengthy process - and wood was very scarce during the war.

The British Ministry laid the crisis in the lap of Dr. Chaim Weizmann, a Russion-born professor at the University of Manchester, England. Weizmann and his colleagues experimented with the making of acetone from potatoes, then corn.

ENTER CSC

After the United States entered the war, the British War Mission bought the plant of the Commercial Distillery at Terre Haute and remodeled it for the making of acetone. A little later the government bought the Majestic Distillery, a short distance from Commercial and incorporated the two plants under the name of COMMERCIAL SOLVENTS CORPORATION OF NEW YORK.

Between May 1918 and the close of the war, one and one-half million gallons of acetone were produced.

With the advantages in mind of cheap and readily available raw materials, a group of Eastern business men purchased the Terre Haute facilities from the government and acquired exclusive rights under the Weizmann patents.

Since that time the local plant has grown like Topsy.

PEORIA PLANT

In November 1923, we built a large plant at Peoria for the manufacture of Butanol and Acetone from the fermentation of corn. Three years later the capacity of this plant was doubled. In 1931, the use of molasses as a raw material was started to replace the use of corn. Since World War II corn has again replaced molasses.

In 1923, we also built a high pressure synthesis plant for the manufacture of ammonia, later changing over to methanol. This was the first plant in the U.S.A. for production of synthetic wood alcohol or methanol.

Also in 1926, Peoria started manufacturing dry ice and now produces 70 tons of this cold stuff every day.

ENTER ROSSVILLE

In 1933, we annexed the Rossville Commercial Alcohol Corporation and began the production of whiskey and alcohol. This move also gave us our plant out in Agnew, California, for the ~~fermentation~~ PRODUCTION of alcohol and the ~~production of~~ formaldehyde, also two plants in the New Orleans area engaged in the fermentation of molasses to ethyl alcohol.

SPECIALTIES

Just about this time we decided that the automobile was here to stay, so we launched into the manufacture of the now-popular NOR'WAY and PEAK anti-freeze, and a complete line of cooling system chemicals, radiator cleaner, quick-flush, stop-leak, penetrating oil, Dry-Ex, and car wash. The latest acquisition to this prolific family of NOR'WAY is the windshield washer fluid and carburetor cleaner.

DIXIE ORDNANCE

Following Pearl Harbor, the government asked Commercial Solvents to superintend the building of a plant down at Sterlington, Louisiana - and then run it after it was finished. During the war, this sprawling plant earned many plaudits for its performance. It manufactured 150 tons of ammonia per day for explosives. After the hostilities, Commercial Solvents had the opportunity of buying the plant from Uncle Sam and we began turning our swords into plowshares, as it were, for instead of manufacturing ammonia for explosives,we are using it in fertilizer to be used on the impoverished farms of the southland. This plant has also been enlarged to produce about 50,000 gallons of synthetic methanol per day since World War II.

PENICILLIN PLANT

Keeping up with an ever-expanding company such as ours is like trying to watch a three-ring circus with your alloted one pair of eyes. While the Dixie Ordnance was being drafted into war service, the world-wide cry for the miracle drug, PENICILLIN, reached the Banks of the Wabash. It was then that the penicillin plant was born.

PENICILLIN PLANT (Continued)

We established some sort of record in the construction of that penicillin plant. Because of the serious need for this drug by our wounded men, we were given top priority on all material which went into the construction of the plant. From blueprint to the finished building - only 180 working days had elapsed. This plant was financed completely by our own company and not through the government.

Another first for Commercial Solvents is the manufacture of the antibiotic, BACITRACIN. So far we are the only company manufacturing it. A new BACITRACIN PRODUCTION UNIT is now under construction just north of the penicillin plant.

Bacitracin spells relief for sufferers of sinus and other stubborn infections.

RIBO

We must not forget to mention that we manufacture by fermentation process a pure riboflavin and a riboflavin supplement. The pure riboflavin is used by bread manufacturers in fortifying bread, and is also used as a source of supply of vitamin G by pharmaceutical manufacturers. The riboflavin supplement is used in stock and poultry feeds.

BENZENE HEXACHLORIDE

Needing additional room for our ever-growing family, CSC purchased a hilltop out on LOCKPORT ROAD - across from Grandview Cemetery - and has proceeded to liven up the otherwise quiet spot.

In 1946 we built a plant for the manufacture - on a commercial scale - of a new and potent insecticide called BENZENE HEXACHLORIDE which seems to leave a lot of bugs stone cold. There is also contemplated a plant for the manufacture of LINDANE out on the hill. LINDANE is very effective on dairy barn flies, who have built up an immunity to DDT, and is used also in fumigating grain and grain-carrying box cars.

NOR'WAY CANNING LINE

The large building which commands the center of the stage on Lockport Hill houses the canning line for the prolific family of NOR'WAY automotive products. The front of the building contains the offices of the Specialties and Agricultural divisions as well as the Advertising Department.

NEW RESEARCH CENTER

The doors of the new Research Center were flung wide on October last when an impressive dedication ceremony was held. In this beautiful building, inquisitive CSC scientists are now using the most advanced equipment available to improve the old and discover the new. Also housed in this building is one of the largest technical libraries to be found in the Middle West.

Our main office is located at 17 East 42nd Street, in New York City. We have SALES OFFICES in every key city in the United States. Our far-flung plants are located in Agnew, California; Carlstadt, New Jersey; Monroe, Louisiana; Newark, New Jersey; Harvey and New Orleans, Louisiana; Peoria, Illinois; and all the plants here at Terre Haute.

FORTUNE MAGAZINE

In March of this year, FORTUNE MAGAZINE saluted COMMERCIAL SOLVENTS in their fine publication. As the result of a survey made in our city wherein thousands of townspeople were questioned, FORTUNE SURVEY found that "The BEST company in Terre Haute is COMMERCIAL SOLVENTS. It was so nominated (they went on to say) because it creates the greatest number of opportunities, and therefore, did the most for the town."

1 2e 12 5/26/50

COMMERCIAL SOLVENTS CORPORATION

Early in World War I, the British Fleet had suffered a miserable defeat by the Germans off the coast of Chile because the shells they were using plopped harmlessly into the water. The reason for this was the poor quality of acetone being used as a solvent in making the high explosives. In those days, acetone was obtained by the distillation of wood - a lengthy process - and wood was very scarce during the war.

The British Ministry laid the crisis in the lap of Dr. Chaim Weizmann, a Russian-born professor at the University of Manchester, England. Weizmann and his colleagues experimented with the making of acetone from potatoes, then corn.

ENTER CSC

After the United States entered the war, the British War Mission bought the plant of the Commercial Distillery at Terre Haute and remodeled it for the making of acetone. A little later the government bought the Majestic Distillery, a short distance from Commercial and incorporated the two plants under the name of COMMERCIAL SOLVENTS CORPORATION OF NEW YORK.....

Between May 1918 and the close of the war, one and one-half million gallons of acetone were produced.

With the advantages in mind of cheap and readily available raw materials, a group of Eastern business men purchased the Terre Haute facilities from the government and acquired exclusive rights under the Weizmann patents.

Since that time the local plant has grown like Topsy.

PEORIA PLANT

In November 1923 we built a large plant at Peoria for the manufacture of ~~methanol, or wood alcohol;~~ BUTANOL AND ACETONE FROM THE FERMENTATION OF CORN. ~~In 1931 Peoria plant began to use molasses, instead of corn, for the making of chemicals. We were the first plant to make synthetic methanol in the United States.~~ Three years later the capacity of this plant was doubled. In 1931 the use of molasses as a raw material was started to replace the use of corn. Since World War II (OVER)

PEORIA (continued)

In 1923 we started up large butyl fermentation plant at Peoria; three years later the production was doubled from 48 to 96 fermenters. They also built a high pressue synthesis plant for the manufacture of ammonia, later changing over to methonal. This was the first plant in the U.S.A. for production of synthetic wood alcohol or methanol. Also in 1926 Peoria started manufacturing dry ice and now produces 70 tons of this cold stuff every.day.....

ENTER ROSSVILLE

In 1933 we annexed the Rossville Commercial Alcohol Corporation and began the production of whiskey and alcohol. This move also gave us our plant out in Agnew, California, for the fermentation of alcohol and the production of formaldehyde, also two plants in the New Orleans area engaged in ~~alcohol~~ the fermentation. & subsequently to ethyl alcohol.

SPECIALTIES

Just about this time we decided that the automobile was here to stay, so we launched into the manufacture of the now-popular NOR'WAY, and Peak antifreeze and a complete line of cooling system chemicals, radiator cleaner, quick-flush, stop-leak and anti-rust, penetrating oil, spray lube & rust and carburetor cleaner. The latest acquisitions to the prolific family of NOR'WAY are the windshield washer fluid and ~~Nor'way penetrating oil~~. This penetrating oil is a super lubricant and a rust-busting chemical which quickly frees bolts, studs, corroded pipe joints, etc. Then we thought up the permanent anti-freeze and named it PEAK - but so much for the commercials .....

DIXIE ORDNANCE

Following Pearl Harbor, the government asked Commercial Solvents to superintend the building of a plant down at Sterlington, Louisiana - and then run it, after it was finished. During the war this sprawling plant earned many plaudits for its performance. It manufactured 150 tons of ammonia per day for explosives. After the hostilities, Commercial Solvents had the opportunity of buying the plant from Uncle Sam and we began turning our swords into plowshares, as it were, for instead of manufacturing ammonia for explosives, we are using

it in fertilizer to be used in the impoverished farms of the southland. This plant has also been enlarged to produce about 50,000 gals. of synthetic methanol per day since World War II.

PENICILLIN PLANT

Keeping up with an ever-expanding company such as ours is like trying to watch a three-ring circus with your alloted one pair of eyes. While the Dixie Ordnance was being drafted into war service, the world-wide cry for the miracle drug, PENICILLIN reached the Banks of the Wabash. It was then that the penicillin plant was born.

We established some sort of record in the construction of that penicillin plant. Because of the serious need for this drug by our wounded men, we were given top priority on all material which went into the construction of the plant. From blue-print to the finished building - only 180 working days had elapsed. This plant was built financed completely by our own company and not through the government.

Another First for Commercial Solvents is the manufacture of the antibiotic, BACITRACIN. So far we are the only Company manufacturing it. A new building, ~~costing an estimated $670,000~~ is now under construction just north of the penicillin plant. We hope to have it in operation by July first. Bacitracin spells relief for sufferers of sinus, and other stubborn infections. ~~for one thing.~~

RIBO

We must not forget to mention that ~~during all this time, we were manufacturing~~ we manufacture by fermentation a vitamin-loaded ~~product~~, riboflavin supplement ~~which is used in the manufacture of poultry and~~ livestock feeds. ~~This riboflavin~~ - or ribo, as we have nicknamed it, - is made ~~from~~ liquid fermentation ~~wastes which~~ were poured ~~into the Illinois River~~ to the tune of ~~a million gallons a day - until the Illinois Conservation Commission demanded that our~~ Peoria plant stop feeding the fish and give the vitamins to something else. This waste was of grave concern until one of our many consultants had the dried waste analyzed and found it rich in riboflavin....

process as pure riboflavin and a riboflavin supplement. The pure riboflavin is used by bread manufacturers in Portuguese bread and is also used as a source of both pure vitamin G by pharmaceutical manufacturers. The riboflavin supplement is used in stock & poultry feeds.

Needing additional room for our ever-growing family, CSC purchased a hilltop out on LOCKPORT Road - across from Grandview cemetery - and has proceeded to liven up the otherwise quiet spot.

In '46 we built a plant for the manufacture - on a commercial scale - of a new and potent insecticide called BENZENE HEXACHLORIDE which seems to leave a lot of bugs stone cold. There is also contemplated a plant for the manufacture of LINDANE out on the hill. LINDANE is very effective on dairy barn flies, who have built up an immunity to DDT, and is used also in fumigating grain and grain-carrying box cars.

NOR'WAY CANNING LINE - The large building which commands the center of the stage on Lockport Hill houses the canning line for the prolific family of NOR'WAY automotive products. The front of the building contains the offices of the Specialties and Agricultural divisions as well as the advertising department.

NEW RESEARCH CENTER - The doors of the NEW Research Center were flung wide on October last '49 when an impressive dedication ceremony was held. In this beautiful building, inquisitive CSC scientists are now using the most advanced equipment available to improve the old, and discover the new. Also housed in this building is one of the largest technical libraries to be found in the Middle West.

Our main office is located at 17 East 42nd Street, in New York City.....We have SALES OFFICES ~~located~~ in every key city in the United States.....our far-flung plants are located in Agnew, California; Carlstadt, New Jersey; Monroe, Louisiana; Newark, N.J; Harvey and New Orleans, Louisiana; Peoria, Illinois and all the plants here at Terre Haute.

FORTUNE MAGAZINE _ In March of this year, FORTUNE MAGAZINE saluted COMMERCIAL SOLVENTS in the their fine publication. As a result of a survey made in our city wherein thousands of towns-people were questioned, FORTUNE SURVEY found that "The BEST Company in Terre Haute is COMMERCIAL SOLVENTS. It was so nominated (they went on to say) because it creates the greatest number of opportunities, and therefore, did the most for the town."

COMMERCIAL SOLVENTS

We are what the pay board calls a middling company - We are not a giant in the chemical industry neither are we a small chemical company - Last year we did under 100 million dollars in net sales.

There are approximately 2,300 people in the domestic operation. These people are scattered around U.S. at the General Office 245 Park Avenue in New York City, the Newark, N.J. plant that denatures alcohol and warehouses product, the Garfield, N.J. plant that produces vitamins, feeding oils and packager of premix for animal/nutrition industry, the Trojan-U.S. Powder and chemical company of Allentown, Pa., another explosive plant at Wolf Lake, Ill., a resin plant at Carpentersville, an explosive plant in Springville, Utah, one at Tacoma, Washington, one of our older plants at Agnew, California, that warehousss for West Coast and denatures alcohol, a deep water terminal and denaturing plant at Harvey, Louisiana, and the three largest manufacturing plants - two of them at Sterlington, Louisiana - Dixie Chemical and Thermatomic Carbon Co., and the original plant, the grandaddy of them all here in Terre Haute.

In addition to this we have the International operation that includes controlling interest in a large fertilizer plant in Medicine Hat, Canada, Comsolmex in Mexico City, Chemsyna, Munich, Germany, pharmaceutical companies in Italy - Instituto and Hoffmann and Kern Espaniola, Spain.

There was this joint venture in Terre Haute - during World War I - two fermentation and distillation plants were acquired jointly by the U. S. and British Government for the production of acetone used in manufacture of black gun powder.

1st acquisition Thermatomic 1931

2nd Rossville Alcohol - subsidiary American Solvents and Chem. Co. of California

1932-1933 American Commercial Alcohol Corp.

1935 - Commercial Molasses Corp.

1938 - Vitamin G - Peoria - Vitamin Feed

Nitroparaffins 1936 - Plant 1940 Peoria

Acquired Lockport Rd. facility 1946 - Purchased Dixie 1946

1948 - Bacitracin

1949 - Choline Chloride - Member of family B Vitamin

Baciferm marketed Dec. 1950 - 1953 Solid AN

1955 - July - Northwest Nitro

Comsolmex 1955

Sept. 1955 NP Plant - Sterlington

Zinc Bacitracin in Baciferm 1957

New Methylamine plant 1957

Louisiana Gas Jan. 1959

1960 - Hoffmann-Lampis Drug Firm - Italy

1961 - Garfield - Stabilized Vitamins

1961 - MSG - plant started 1962

1962 - Acquired McWhorter - resin products - paint and protective coatings

1963 - NP expansion 1963 - U. S. Powder

1964 - Chemsyna - Munich, Germany

1965 - Ralgro - weight gain for cattle supplement - esterogenic chemical anabolic agent - increases protein retention - greater feed efficiency

1967 - Trojan-U. S. Powder 1967 - Big N

This story parallels Dr. Flemings isolation of Penicillin as Dr. Chaim Weizmann isolated his strain of bacteria from a sweet potato and found that it would produce acetone the wanted product also there was butyl and ethyl alcohol produced as by-products.

Following the war Commercial Solvents was organized in 1919 and acquired the facilities at Terre Haute April 1, 1920, primarily to produce and develop the market for acetone - Here we were with increasing quantities of butyl alcohol and a very limited market after the plant went into operation April 1, 1920, it was discovered that butyl and its derivatives were prime solvents for fast drying nitro cellulose lacquers that the automobile industry needed. This is what prompted someone to write one thing leads to another - as the demand for butyl increased the old Magestic Distillery was purchased in Peoria which was doubled in 4 years. The old ABE process released H_2 and CO_2 gases as it was fermenting the products we could sell - this led to Solvents starting a methanol plant in 1927 - the first synthetic methanol plant in U. S. - using waste gasses from fermentation - later natural gas was substituted which led to all future methanol expansions to be made in the south.

Because of natural gas field in Monroe, La., area the Government built an ordance plant at Sterlington, La., to produce NH_3 in World War II and as CSC was in Sterlington already at Thermatomic Carbon we were chosen by the Government to manage and operate the Dixie Ordance plant - CSC puchased this plant in 1946.

We were essentially a fermentation Company in our early ventures - prohibition was in effect so we were not fermenting drinking alcohol - But then we started making acquisitions - Thermatomic Carbon Company was acquired

in 1931 - Then the Rossville Alcohol Company and their subsidiary American Solvents and Alcohol of Cal., was acquired in 1933. These companies fermented molasses to produce ethyl alcohol most of it went into Industrial Alcohol - this led to purchase of Commercial Molasses Company in 1937.

Today one of our largest generations of sales dollars is in the Industrial Alcohol area - We are known in the chemical trade as a producer of fine alcohols and denatured alcohol.

Here at Terre Haute ethyl alcohol was being produced from corn - all waste was going to the river - 1935 Terre Haute a distillers dried grain feed house was built and we recovered waste from ethyl alcohol. In 1938 a system was put in in Peoria to evaporate and dry the waste from molasses fermentation. We found that this contained a Vitamin G - so we were in the feed business. Now we set fermenters in a sterile atmosphere that produce the antibiotic that we choose and this is not a waste product.

Today in Terre Haute we have 10 million pounds (42,000 lbs. BOD/day) of oxygen consuming material in the form of waste that must be disposed of - currently 90% of our BOD and almost 100% of our settleable solids are removed .

Land application spray system for fermenter waste and an aerobic lagoon for chemical wastes - 5 separate sewer systems, 7 treatment and control systems and 18 monitoring points.

TMA odor threshold of 21 PPB the lowest of the commonly used industrial chemicals - NH_3 has odor threshold 47 PPM or 2240 times more NH_3 can be mixed with atmosphere before detected than TMA.

We are more facility than plant here in Terre Haute as our Corporate

R & D is based here, Corporate Engineering, Corporate Purchasing, Corporate Data Processing, Corporate Distribution Division, the Animal Nutrition Sales Division, Corporate Operation VP and staff. In our Manufactu ring Division we are broke up you might say geographically - at the 1st street level we have our chemical manufacturing ethyl alcohol denaturing and feed plant operations - over the hill our fermentation and antibiotics products are produced -- Then here in town we have 3 plants - 1st and Washington or Main plant, South plant on Prairieton Road about 1 mile away - which is a warehousing operation and whiskey rack house operation--then the East plant or Lockport Road plant is where the Distribution Division is located, warehousing of raw materials and animal testing area is located.

In our Fermentation area as of now we are producing glutamic acid which is recovered as monosodium glutamate - the food enhancer - this was started in 1960. Bacitracin is finished and bulk of this goes into Baciferm feed an animal food antibiotic - part of the bacitracin gets into pharmaceutical bacitracin - Baciferm was first marketed in 1950 and 1957 zinc bacitracin came on the market a more stable form - we have done contract fermentation in this area.

Our feed plants produce miscellanous feeds that are mixed to formula ordered - that is certain concentrations of bacitracin - Riboflavin some pre-mixes with niacin - penicillin and Baciferm. Choline supplements used primarily in poultry feeds contain choline chloride which is a fat metabolism vitamin. Choline chloride uses one of our basic products, TMA, as a starting point - We were one of the first to produce this in 1949. The single train plant in chemical manufacturing is the methylamine plant which upgrades

our raw materials produced down south - methanol and ammonia. Then we produce a great number of derivatives most of these are products that are up grading other products. We bring in concentrates from the various nitro-paraffin derivatives produced in our Dixie plant and crystallize these to a fine technical chemical - we usually refer to the abbreviated name such as AMPD - Amino Methyl Propanediol or NMP - Nitro Methyl Propanol. These are what we have referred to as our exotic chemicals - we started producing nitro-paraffins in pilot plant 1936 - then to a semi-commercial plant in Peoria in 1940 - then a large plant in Sterlington 1955 - this was doubled in size in 1963 and doubled again in 1969, and our Marketing people say we should be looking at 1975 for another expansion.

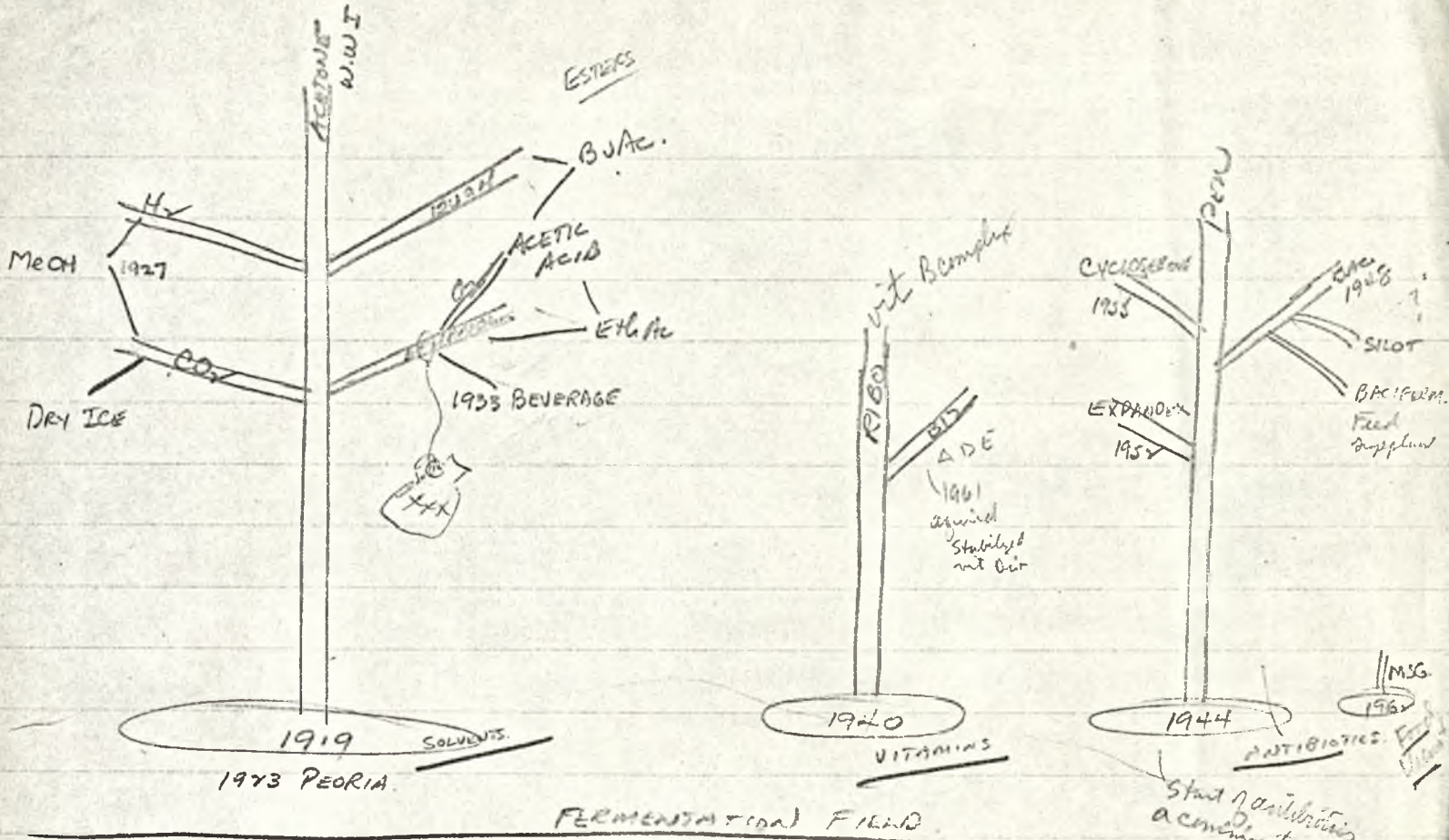
The McWhorter Chemical Co. acquired in 1962 was purchased to make use of nitroparaffins and their derivatives - this operation has now been increased 4-fold by moving out of downtown Chicago and expanding out at Carpentersville, Ill.

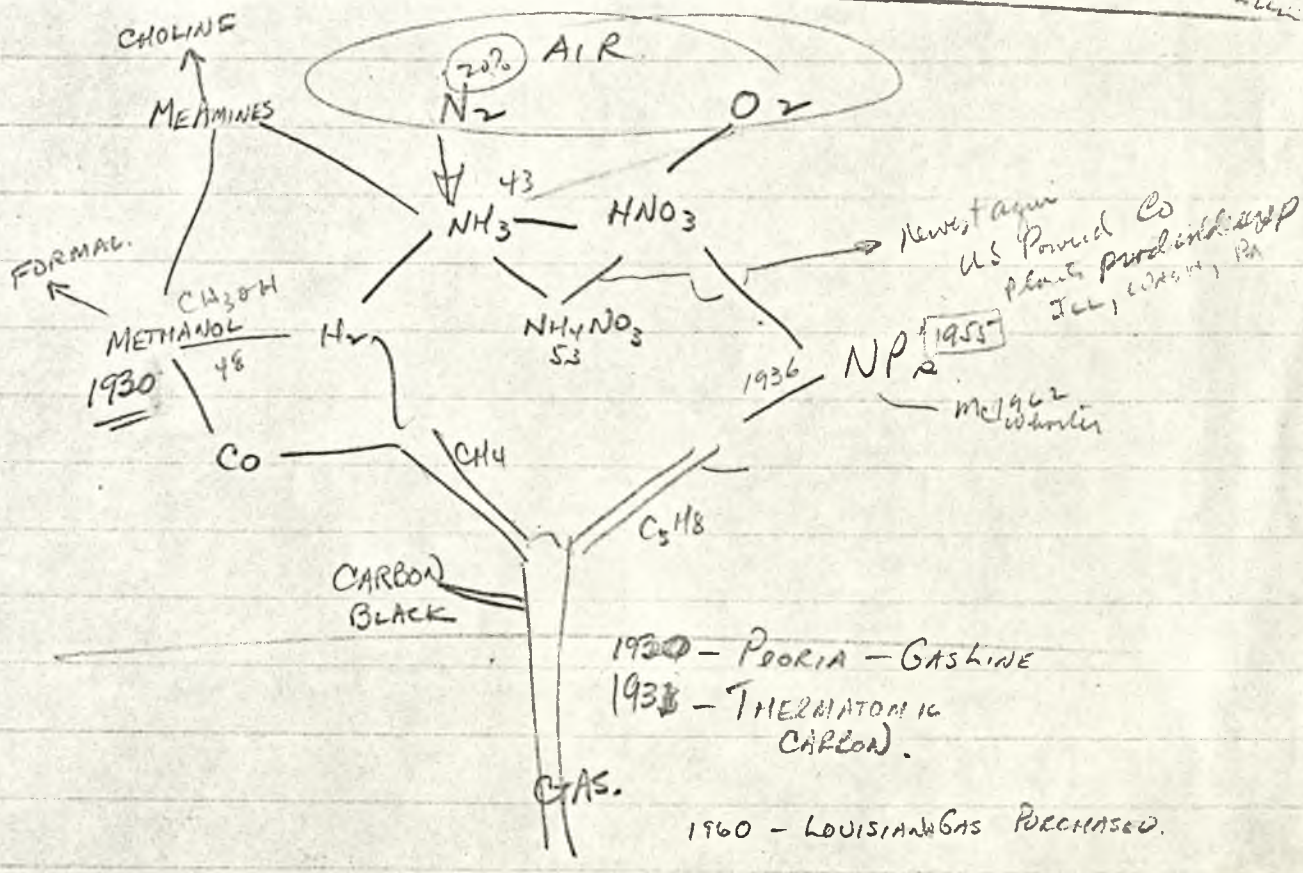
Two of the products that I'm sure most of you have heard of in the last few years - one has the tradename of Ralgro - announced in 1965 the RALs - resorcylic acid lactones are anabolic agent that increases protein retention and greater feed efficiency has been approved by U.S. DA, many foreign countries and used on beef cattle and lambs as produced here in Terre Haute. Italy,
The other new product developed by Instituto in Milan/- one of our International Companies - and announced in 1969 is called C-3 and is still in the testing and experimental stage - we expect it to be useful in cardiac infarction.

So chemical companies are always looking for new products - new ways to use the equipment that they are now using - constantly changing -

as I said earlier - one thing leads to another.

R & D comes up with a new arrangement of the molecules using some of the raw materials and they go to Marketing to say can you develop a market for this product. Then we are constantly being besieged by Marketing people can you produce this chemical in the equipment you have in the plant for a price -- I can tell you the small reactors, stills, crystallizer, are very seldom idle as they are multiple pieces of equipment that can produce many products.

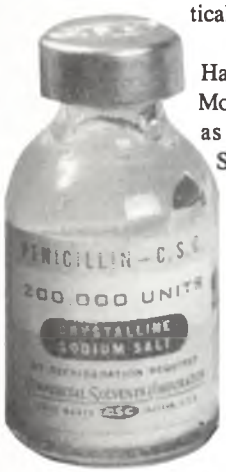




PETROCHEMICAL FIELD.

Terre Haute Plant Still Pioneers in Production

TERRE HAUTE, Ind. – Along the banks of the fabled Wabash River in this western Indiana town stands a plant that pioneered the use of biological processes for the production of industrial and pharmaceutical products.



In 1918 the Terre Haute plant of Pitman-Moore, Inc., then known as the Commercial Solvents Corporation, pioneered the production of acetone – a solvent used to make cordite for British Navy shells in World War I – through the fermentation of grain starch.

Company history has it that at the outbreak of World War I, a desperate shortage of acetone developed in Great Britain. Acetone was made at the time by the distillation of wood that had to be dried for six months. It was urgently needed not only to make cordite, but also as a solvent for nitrocellulose dopes used in finishing airplanes.

A frantic search was launched for a quicker process to make acetone, which lead to an English university, where a Russian-born chemistry professor, Dr. Chaim Weizmann, was making butyl alcohol – and acetone as a by-product – for an attempted synthesis of rubber.

Dr. Weizmann later developed a more efficient grain-feeding bacterium, *Clostridium acetobutylicum Weizmann*, which produced the required acetone at an unprecedented rate. The British government quickly adopted the process and started production at plants around the world. Dr. Weizmann refused personal honors from the British government, but asked for official aid for the Zionist cause, or the creation of a Jewish homeland in the Middle East.

After the United States entered World War I, the U.S. Air Service and the British War Mission purchased a whiskey distillery on the Wabash in Terre Haute and adapted it for production by the Weizmann process, and so was born the Commercial Solvents Corporation of New York (for corporate history buffs, visit your local regional library or state university library for a further fascinating history of Commercial Solvents Corporation published in *Fortune* magazine, October 1944, page 135).

So began the company's proud history as a pioneer in the biological production of industrial and pharmaceutical products and as a contributor to the U.S. war effort. Not to be outdone by its contribution in World War I, the Terre Haute plant made other major wartime contributions: in World War II it pioneered the production of the "miracle drug" penicillin, an antibiotic that was credited with saving the lives of many wounded in the war, as well as those suffering from pneumonia, meningitis, gas gangrene as well as venereal diseases; in the Korean war it produced dextran, a blood expander that temporarily took the place of lost plasma to restore blood volume when plasma was not immediately available.

During World War II the Terre Haute penicillin plant was designed and built with a revolutionary "deep culture" process and placed in operation in less than six months in 1943. It had the capacity for *twice* the entire amount of penicillin produced in the U.S. that year through traditional surface culture methods.

In 1969 Commercial Solvents Corporation introduced a growth promotant implant for use in cattle based on a compound extracted from a naturally occurring corn mold. From its humble origins it quickly became the number one implant in the cattle business and remains today the most successful growth promotant ever offered – Ralgro®.

And the Terre Haute plant remains in the forefront of technology today with the completion of its $50 million PST (porcine somatotropin) plant, which promises to be a revolutionary, recombinant DNA product used to produce lean pork.

Today the plant employs 368 people in a major Pitman-Moore production facility and in worldwide Pitman-Moore research and development headquarters. In addition to Ralgro, the plant produces Baciferm®, a feed antibiotic for swine and poultry, contract chemicals for other companies, and is gearing up to produce Clinacox®, a poultry feed coccidiostat produced under license from a Belgian company.

Terre Haute workers have distinguished themselves by working for three years – over 2 1/2 million hours – without a lost time accident. Since Commercial Solvents Corporation was acquired by IMC in 1975, the company has placed a great deal of emphasis on safety, says Bob Urban, Director of Operations.

The research and development staff have also distinguished themselves in community service activities, helping to bring science to the community and the classroom in Terre Haute.

Among many other activities, the Terre Haute research staff sponsors an annual National Chemistry Week display in the local shopping mall and brings science demonstrations to the local schools.

From its beginnings as a whiskey distillery at the turn of the century, the Terre Haute plant has grown to include 572 acres and 63 buildings on three sites.

New Service Award Program

Despite some initial start-up problems, the company's new service award program is up and running.

"The awards are beautiful, valuable awards, and there's a wide selection of gifts ranging from gold-filled jewelry to Lenox china and crystal, Seiko and Bulova clocks and watches, English pewter, Oneida silverplate, and Hartmann luggage, as well as many other things," says Human Resources Director Diane Heffner.

Under terms of the program, employees are eligible for a wide range of gifts on the anniversary of their fifth year with the company and on every subsequent fifth year. An additional special appreciation gift is provided at the tenth year of service.

Service pins, color coded by years of service, and special retirement gifts are also included in the program.

The program, which was over a year in the planning, had some start-up problems when some employees didn't get what they ordered – or only part of it. "We feel very badly that some people have had problems getting their awards, and apologize for the inconvenience, but the initial problems are pretty much resolved," Heffner says.

Stacey Pawlowski, Mundelein Human Resources Assistant in charge of the new program (708/949-3594), has been assigned the role of troubleshooter for any future service award problems that cannot be resolved by your supervisor. Employees may obtain service award program information from their Human Resource Department.

A Day in the Life of a Product Manager

Editor's Note: *This is the first in a series of articles about jobs that help explain our business and what your fellow employees do each day. These articles are provided to help readers learn about the "bigger picture" of our business.*

Ed Haddad

MUNDELEIN, Ill. – Ed Haddad's day begins between 6 a.m. and 6:30 a.m., when he arrives at the office to begin another day of work as Pitman-Moore's Biologicals Product Manager.

The 38-year-old native of Utica, N.Y., is a relative old-timer with Pitman-Moore, having first joined the company as an ethical sales representative in western New York State and northwestern Pennsylvania in late 1980, when Pitman-Moore was still owned by Johnson & Johnson and headquartered in Washington Crossing, N.J.

Haddad gets into the office early each day before sales representatives from across the country start calling each morning around 8 a.m.

"I spend a lot of time on the phone," says Haddad, who earned a B.S. degree in biology from the University of Buffalo in 1975. "Almost too much time, but that's part of the job." The sales reps call with requests for product information or reports on competitors activities in the field. Their calls are vital, Haddad says, and allow him to assess competitive pressures in the field and to plan strategies for his products accordingly.

Haddad pays a lot attention to the daily sales figures, which are distributed to him and other product managers each morning in a computer print-out which lists the previous days sales based on each major product line. Haddad and the other product managers use this data to see how close they are to realizing targeted sales objectives and to plan strategies to help achieve them.

The primary responsibility of his job, as Haddad sees it, is to coordinate all the tasks needed to ensure that biological products achieve annual profit goals. "We run the business as our own, and gain the sales volume needed to reach company financial goals," Haddad says. "So we're continually working to gain maximum margins."

In addition to direct line responsibility for managing the biological business, under the supervision of his manager, Frank Lupton, Senior Marketing Manager, Alpha Group, Haddad also has responsibility for biological product roll-outs – such as Pitman-Moore's GenetiVac™ FeLV feline leukemia vaccine introduced last fall – and interaction with the sales, marketing communication, finance, materials management, production, R&D, regulatory, order services and customer services departments.

Under Pitman-Moore's philosophy of decentralized management, product managers play a key role in directing the entire marketing effort – from determining sales strategies to making sure there's enough product on hand, to making sure it's delivered on time. Overall, they're also charged with ensuring they achieve their allotted portion of the company's bottom-line profits and other financial targets.

"We develop an annual market plan that identifies marketing positions, competitive activities, the critical issues, strategies, tactics, and action plans," Haddad says. "And we set up a sales plan, based on our marketing activities, then, in turn, finance inserts a cost of goods, and an earnings plan for the new year is developed. Then we set the budget for the year – the expenditures – and it's our responsibility to meet or exceed the set profit plan."

Haddad believes in plenty of contact with sales reps in the field by phone. He also occasionally ventures out into the field himself when time permits, such as his trip to a cattle feedlot in Colorado last month. "I think a key ingredient for success is to be in touch and know what's going on in the marketplace," Haddad says. "Because the company calls on you to make the decisions based on what you know about the marketplace, and it's continually changing."

Biologicals are faced with an eroding selling price, Haddad says, because there are so many other companies in the market selling essentially the same thing.

The solution is to keep prices up by selling quality products, he says, as well as having unique products. The key to selling largely generic biological products is to stress product features, functions, or benefits over the competitors.

Another important skill is negotiating the licensing of products from other companies for distribution under the Pitman-Moore name. "The industry holds a lot of opportunities for companies that continually look for new and unique biological products," Haddad says.

THE Pitman-Moore Legend

The North America animal health business region employee newsletter

TOM KING, EDITOR
PITMAN-MOORE, INC.
421 EAST HAWLEY ST.
MUNDELEIN, IL 60060 USA
PHONE: 708/949-3199
FAX: 708/949-3555

An Equal Opportunity Employer

THE Pitman-Moore Legend

THE NORTH AMERICA ANIMAL HEALTH BUSINESS REGION EMPLOYEE NEWSLETTER JULY 1991

Hawk and Lindsey Return From Persian Gulf War

KANSAS CITY, Kan. – Employees Peggy Hawk and Ray Lindsey are glad to be back from the Persian Gulf War after months of service in the first successful large-scale U.S. military operation since the Korean War.

"I was never so happy to see the United States," said Hawk, 22, a forklift driver and warehouse worker in Kansas City. "When the wheels started lifting off the runway (on our return trip home), everybody started cheering... I'm glad I'm home. I'm glad it's over," she said.

Lindsey, 48, a packaging supervisor in Kansas City, was also pleased to be back. "I don't look at myself as a hero," he said. "I look at it as there was a job to do, and we went and did it, and it was time to come home."

Hawk, an E-4 Specialist in the U.S. Army Reserves, helped deliver the mail for the U.S. Army 3rd Armored Division and volunteered for a special fast track program that followed the 3rd Armored Division into Kuwait and Iraq.

While not stationed close to the front lines, Hawk nevertheless had a near miss with death. She stayed in a warehouse in the port city of Dhahran, Saudi Arabia, for several days after first arriving. Shortly after she left it was demolished by a SCUD missile.

She was one of three women chosen for a special nine person fast track mail delivery program that followed the 3rd Armored Division into Iraq. "We went up there and set up a couple of tents and they flew the mail into us on Black Hawk helicopters the first two days until some of the transportation units got freed up from taking ammo and rations in there and got to come back and pick up some mail," Hawk said.

She later went souvenir hunting in captured Iraqi positions with a demolitions expert, who first searched the tents for booby traps before permitting her to enter. She found some coins, medals, and a black Republican Guard beret.

Hawk joined the U.S. Army Reserve in February 1989 to earn money to study computer electronics in college. She had just enrolled in classes before the war began last August but had to drop out temporarily to go overseas with the Army. On the day she returned to work, May 28th, she was was greeted with a "Welcome Back" banner, an ice cream party, and was presented with a video cassette recorder.

She and her family were later the guests of honor at the Coopers annual picnic when Dr. Vincent T. Scialli, Vice President & Managing Director, North America, presented her with a check in appreciation of her efforts.

The Human Resources Department in Kansas City kept in contact with the soldiers and their families throughout the war, as did other many employees, including top company executives.

Peggy Hawk

"On behalf of all employees at Pitman-Moore and its management," Dr. Scialli wrote on March 6th, "I would like to personally tell you how proud we are of you and our armed forces colleagues who are representing our country in Operation Desert Storm."

"Words on paper cannot describe the feelings here at home knowing what you are going through on the front lines. The feeling is one of concern, but also one of extreme support and pride."

Ray Lindsey is a Sergeant First Class assigned to the 418th Civil Affairs Co. of the U.S. Army Reserve. At press time he has just returned from an extended five month tour of duty helping civilians in war-torn Iraq. Lindsey's assignment took him to Saudi Arabia, Bahrain, Kuwait, southern and northern Iraq – even Turkey – as one of the most traveled members of U.S. forces involved in the Persian Gulf War.

A 22 year veteran of the Reserves, Lindsey was attached to a unit that helped the nomadic Bedouin tribesmen in the desert during the war. "Our role," he said, "was to locate as many people as we could, assist with medical supplies and food and water distribution. We had to be extremely careful because unexploded ordnance and mines were in abundance. At times it became quite nerve wracking, and we couldn't deviate from trails."

Lindsey's day would begin around 8 a.m. and end around dusk when he and his fellow soldiers would venture out into the desert in blazers or pick-up trucks, accompanied by a tank or armored personnel carrier and an interpreter, to distribute their supplies. The Bedouins often invited the soldiers into their tents to smoke cigarettes and drink tea.

Lindsey enjoyed the missions to small desert hamlets the most, which were sometimes occupied by only three or four families and their children. "Once you rolled into a town, you had the populace there, and they had all this time on their hands because they had nothing to do because they were without electricity... It was just kind of like, 'Hey, party time! The Americans are here! Let's all go down to the town square and see what's going on.' And that's what they did."

People lined up for medical treatment,

continued on page 2

A Message From the Top

Teams Win

By Dr. Vincent T. Scialli

A Special Note

As we go to press, the last of our fellow workers has just returned from duties overseas in Operation Desert Storm. We are very proud of Peggy Hawk and Ray Lindsey, both from Kansas City. We thank them for their service on behalf of America and welcome them back to our winning team. We join their families in thanking God for their safe return from the war. We are proud of their dedication and high level of performance, as well as that of all of our troops who performed so nobly in helping to free Kuwait.

By the time you read this, our 1991 fiscal year will have just ended. Our new fiscal year will just be beginning.

Our 1991 fiscal year has really been a challenge. All regions were faced with very aggressive performance objectives in the wake of continued change, reassessment, and many hurdles, not to mention the global situation due to the Middle East crisis. Needless to say, we in senior management are pleased that our major performance objectives were achieved as we reached toward our goal of being the world's leading animal health and nutrition company. The animal health world has definitely taken notice of Pitman-Moore, its progress and accomplishments, as we strive to develop and keep our competitive advantage.

IMCERA, our parent company, and Wall Street have also taken note of Pitman-Moore's accomplishments and results. This has been fairly evident in IMCERA's stock price, which has performed much better than the market in the past year. Pitman-Moore is now one of IMCERA's "pillar" companies on which they intend to build their business. The other cornerstones are Mallinckrodt Medical and Mallinckrodt Specialty Chemical, who are also performing better than expectations. It is these expectations and our performance against them that determines the level of resources and investment that will be committed to our future growth. As long as we deliver our commitment, we will continue to receive the high level of support we have received from IMCERA to date. So far – since the new Pitman-Moore was founded two years ago – we have accomplished what we said we would.

To achieve the high performance level that was expected of us, it took a major effort and commitment from all employees. We applaud your effort. We will have to continue to give it our all in the future. It does not get any easier from here.

We must continue to strengthen our business. Our experience in the past two years has made us more resilient to the effects of change and positions us to affect change in a pro-active manner. We will continue to strengthen our business and eliminate weaknesses, whatever they may be. You have heard me say before that we never really reach the elusive finish line. It is always in front of us. As long as we strive to get better each day, we will stay close to that line. If we become satisfied with our past accomplishments, we will fall behind and be overtaken by our competitors. We won't let that happen. The year ahead will be a challenge once again. We are proud of our past, but we want to be more proud of our future. Help keep us on the winning team.

Thanks for your past performance and accomplishments. Good luck and work hard in our new fiscal New Year.

Back from the Persian Gulf

continued from page 1

food, water, and supplies, and Lindsey spent a great deal of his time trying to make sure the soldiers weren't mobbed by anxious civilians and the ever-present children. "The kids liked us," he says. "They were always waiting for us. They were out there in droves. They would see us coming and it was like 'The Call of the Wild.' They'd just mob you. A lot of our time was really occupied with trying to keep them under control so we could attend to business."

The troops at times played with the children, entertained them – Lindsey even tried to teach some of them a song. "They were pretty good imitators, but somehow couldn't quite master the English words," he chuckles, thinking back on the experience.

"I have in my memory so many faces and places," Lindsey wrote to his brother, Frank, back home in Liberty, Mo. "I have seen happiness and sadness." He saw day turned into night in burning Kuwaiti oil fields. Overall, however, Lindsey said it was an exhausting experience that he wouldn't care to repeat.

Just about the time Lindsey and his fellow soldiers were hoping to come home after the war, however, his work started again when his unit was assigned to help the Kurds who fled into the mountains in northern Iraq.

On May 1st, Lindsey and his company were sent to Incerlik, Turkey, prior to entry into northern Iraq to help establish a camp for 25,000 Kurds who had fled Iraq in the aftermath of the war and were now returning home.

Ray Lindsey with Kurdish children in northern Iraq.

"I feel real good about the help that we were able to give to not only the Shiites in the south, but the Kurds in the north," Lindsey says. "You can take all the Army rhetoric out, and what it boils down to is people helping people."

IMCERA

IMCERA Group Inc.
2315 Sanders Road
Northbrook, Illinois 60062
708-564-8600

September 20, 1991

Dear Pitman-Moore Location Contact:

I am pleased to provide you with the attached two-page article on IMCERA in the October 1, 1991 issue of Financial World magazine.

I hope you will share this article with employees at your location through a bulletin board posting and/or another distribution method.

If you have any comments or questions about this article, please feel free to contact me by phone at (708) 205-2270 or fax at (708) 205-2271.

Best regards,

Dave

David A. Prichard
Director, Corporate and
Investor Relations

attachment

MORE THAN A NAME CHANGE

When IMC became Imcera, it got out of cyclical fertilizer and into profitable health care.

BY JAGANNATH DUBASHI

FEW COMPANIES HAVE ESCAPED disaster as nimbly as IMC Corp., which got out of the cyclical fertilizer business in 1988, switched to human and animal health-care products and later rechristened itself Imcera Group. On Wall Street, the stock price of the $1.6 billion-in-revenues company has tripled and Imcera now sports a p/e of 27, or 20% better than that of established drugmaker Merck.

That premium is even more impressive because Imcera's return on capital is still in the single digits and is not expected to rise into double figures until the mid-1990s, when new products fatten the bottom line.

Credit for this corporate transformation goes to Imcera's grandfatherly 65-year-old chairman and CEO, George D. Kennedy. What wows Wall Street is that, first, Kennedy pulled it off without accumulating a mountain of debt and, second, that he neatly sculpted the new company into self-sufficient subsidiaries easily understood by analysts and investors. He did this by spinning off the fertilizer operation into IMC Fertilizer, then used $429.2 million from the 1988 sale of the stock, along with over $400 million from sundry asset sales, to finance development at Imcera's new companies.

In 1986, Kennedy acquired St. Louis-based Mallinckrodt, a 124-year-old health-care products company, for $700 million from Avon Products. Under Avon, which wanted to get back to its core cosmetics business, Mallinckrodt had been starved for resources. But its diagnostic products offered just the prospects that Kennedy's strategists wanted. Using Mallinckrodt's expertise, Imcera created another related business in specialty chemicals linked to medicine.

In 1987, Kennedy paid $38 million for Pitman-Moore of Lake Forest, Ill., a maker of feed supplements for animals. Two years later, Pitman-Moore was beefed up with the purchase of Cooper's Animal Health Group from ICI and Wellcome of London for $225 million. Cooper's makes animal vaccines and related veterinary products.

As part of his grand redesign, Kennedy shrank the staff of the parent company from 10,000 people to just over 100, who are housed in a cozy, light-filled company headquarters complete with an indoor garden in Northbrook, Ill. There was a very practical reason for keeping Imcera lean at the top. Kennedy knew next to nothing about the three units' high-tech products, so he left the operating divisions autonomous. Each has its own management, sales force and laboratories. And each sets prices on its own and will soon have its own computer system.

Kennedy and his chief operating officer, M. Blakeman Ingle, oversee strategy and allocate money for development by the three divisions. Their brief, says Kennedy, is to "achieve economic, technological and organizational self-sufficiency as rapidly as possible." The three divisions have responded with a slew of new products and increasingly generous contributions to Imcera's bottom line. At the Mallinckrodt Medical division, which focuses on pharmaceuticals and instruments that make it easier to analyze internal organs and processes, earnings are up 150% since June 1988. Earnings at Mallinckrodt Specialty Chemicals—the world's leading maker of acetaminophen, an active ingredient in such painkillers as Tylenol—are up 78% over the same period in a tough selling environment for chemicals. At the Pitman-Moore animal health division, earnings jumped 33% in the fiscal year ended June 30, 1991.

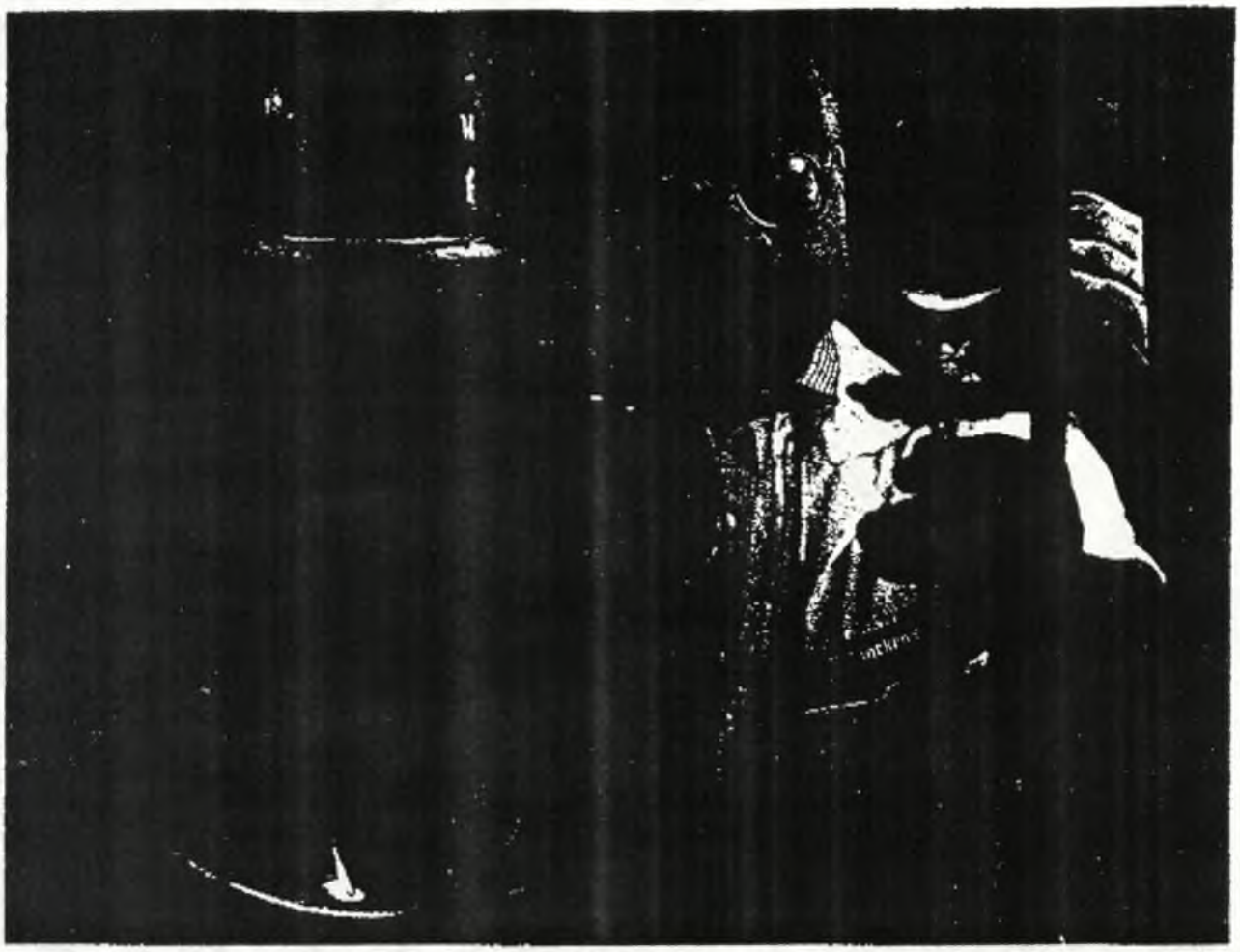
Merrill Lynch analyst John Roberts believes that Imcera's earnings will grow at better than 20% a year for the next three to five years, from "clearly identifiable product campaigns." These include a new imaging agent (ingested before X-rays to highlight body parts) that replaces a 30-year-old product. There's also an exciting new machine that, in two minutes, runs dozens of tests on a sample of blood at the patient's bedside. Roberts thinks that Imcera will earn close to $9 a share by fiscal 1995. "Kennedy gets full marks for carrying out the metamorphosis from fertilizers to medicine," says Roberts.

Kennedy says he learned a lesson in asset management from the chaos in the fertilizer industry during the mid-1980s. "If your responsibility is to come up with the best possible value for your shareholders consistently over time, then you've got to preside over investments as if they were not forever," he says. "Fix it if it's fixable. But get out if it ceases to contribute to shareholder value."

Ingle adds that too often managements get lost in trying to combine functions and save money. It's more important, he says, to concentrate on boosting sales through good products. "Let's say we combine two functions and save $200,000," explains Ingle. "Is it more important to focus on that, or focus on more sales, higher margins? Then that $200,000 disappears pretty fast."

Kennedy also warns: "If at any time the corporate group cannot continue to add value to the companies, we'll get rid of the corporate group and give the shareholders direct control of each of the companies. We don't need the corporate apparatus if it isn't contributing anything."

Kennedy predicts that by the mid-1990s, Imcera will be a $2.5 billion company, with each of the divisions earning 15% on invested capital. At the moment, all three are still growing and have several new products in their first or second years. Operating margins work out to just 11.3%, and the return on capital



Researcher at Mallinckrodt Medical

is less than half the stated goal of 15%.

Analyst Charles LoCastro of Donaldson, Lufkin & Jenrette says that one of the reasons he likes Imcera is Kennedy's flexible approach to management. LoCastro thinks Imcera has "excellent prospects for rapid, noncyclical earnings-per-share growth," and he adds, reflecting the Kennedy-Ingle philosophy that nothing is forever, "I think there's a very good chance that they will spin off individual pieces in the future."

If Imcera has the look of a holding company that simply runs an investment portfolio, nothing could be farther from the truth, insists Ingle. An investment portfolio implies a hands-off management style, while at Imcera, "we really do have a hands-on approach to our business because we work out a strategy and make sure it's being carried out."

Imcera's companies can spend up to $1 million without asking permission from headquarters. "But if a $100,000 purchase means a change of direction," says Ingle, "we want to know about it."

The Imcera executives offer the development of a product line at Mallinckrodt as an example of their management approach. When it was acquired, Mallinckrodt President Raymond F. Bentele told Kennedy that the first thing his company needed was a full pipeline of new products. One of these was the imaging agent Optiray, which Bentele hoped would replace Mallinckrodt's 30-year-old Conray product. Optiray was claimed to be safer, without the allergic reactions that Conray induces in a small number of users. Optiray would also be more lucrative because it costs $50 per application, versus $5 for Conray.

With Imcera's prodding, Optiray debuted in the U.S. in 1989 to rave reviews. Less than two years later, Kennedy approved a $42 million expansion of Optiray production capacity, which works out to half of Imcera's capital spending for the year. But this was necessary if Optiray had any chance in a market for imaging agents that is expected to grow to $3 billion worldwide by the mid-1990s. "It was the money, sure, but it was also the response time," says Kennedy. "One of the reasons we have succeeded with these companies is that they have moved very quickly." Bentele agrees: "He pushed us faster than we had a mind to do in getting that pipeline refilled."

As for the future, the big question is, Will Imcera continue as a federation of companies after Kennedy retires this year? He is likely to be succeeded by Ingle, who is a more hands-on person than the relaxed Kennedy. Ingle is a microbiologist who has been with Imcera and its predecessor for over 10 years, most of the time as its research director.

"It's going to be hard for me to stay out of the lab," Ingle laughs. "I would be much more involved with the businesses than Kennedy has been." But, he adds, "I'm not going to say, 'Run this project this way.' I'm not going to micromanage." ■

****PM5 - 1 of 4**
Pitman-Moore newsletter
Terre Haute plant feature
Headline: Terre Haute plant still pioneers in production
Photos: 1) penicillin product photo, and 2) aerial plant photo
Cutlines: Commercial Solvents Corporation penicillin was a major contributor to the U.S. victory in World War II.
From its beginnings as a whiskey distillery at the turn of the century, the Terre Haute plant has grown to include 572 acres and 63 buildings on three sites.

TERRE HAUTE, Ind. – Along the banks of the fabled Wabash River in this western Indiana town stands a plant that pioneered the use of biological processes for the production of industrial and pharmaceutical products.

In 1918 the Terre Haute plant of Pitman-Moore, Inc., then known as the Commercial Solvents Corporation, pioneered the production of acetone – a solvent used to make cordite for British Navy shells in World War I – through the fermentation of grain starch.

Company history has it that at the outbreak of World War I, a desperate shortage of acetone developed in Great Britain. Acetone was made at the time by the distillation of wood that had to be dried for six months. It was urgently needed not only to make cordite, but also as a solvent for nitrocellulose dopes used in finishing airplanes.

A frantic search was launched for a quicker process to make acetone, which lead to an English university, where a Russian-born chemistry professor, Dr. Chaim Weizmann, was making butyl alcohol – and acetone as a by-product – for an attempted synthesis of rubber.

Dr. Weizmann later developed a more efficient grain-feeding bacterium, *Clostridium acetobutylicum Weizmann*, which produced the required acetone at an unprecedented rate. The British government quickly adopted the process and started production at plants around the world. Dr. Weizmann refused personal honors from the British government, but asked for official aid for the Zionist cause, or the creation of a Jewish homeland in the Middle East.

After the United States entered World War I, the U.S. Air Service and the British War Mission purchased a whiskey distillery on the Wabash in Terre Haute and adapted it for production by the Weizmann process, and so was born the Commercial Solvents Corporation of New York (for corporate history buffs, visit your local regional library or state university library for a further fascinating history of Commercial Solvents Corporation published in *Fortune* magazine, October 1944, page 135).

So began the company's proud history as a pioneer in the biological production of industrial and pharmaceutical products and as a contributor to the U.S. war effort. Not to be outdone by its contribution in World War I, the Terre Haute plant made other major wartime contributions: in World War II it pioneered the production of the "miracle drug" penicillin, an antibiotic that was credited with saving the lives of many wounded in the war, as well as those suffering from pneumonia, meningitis, gas gangrene as well as venereal

diseases; in the Korean war it produced dextran, a blood expander that temporarily took the place of lost plasma to restore blood volume when plasma was not immediately available.

During World War II the Terre Haute penicillin plant was designed and built with a revolutionary "deep culture" process and placed in operation in less than six months in 1943. It had the capacity for *twice* the entire amount of penicillin produced in the U.S. that year through traditional surface culture methods.

In 1969 Commercial Solvents Corporation introduced a growth promotant implant for use in cattle based on a compound extracted from a naturally occurring corn mold. From its humble origins it quickly became the number one implant in the cattle business and remains today the most successful growth promotant ever offered – Ralgro®.

And the Terre Haute plant remains in the forefront of technology today with the completion of its $50 million PST (porcine somatotropin) plant, which promises to be a revolutionary, recombinant DNA product used to produce lean pork.

Today the plant employs 368 people in a major Pitman-Moore production facility and in worldwide Pitman-Moore research and development headquarters. In addition to Ralgro,

the plant produces Baciferm®, feed antibiotic for swine and poultry, contract chemicals for other companies, and is gearing up to produce Clinacox®, a poultry feed coccidiostat produced under license from a Belgian company.

Terre Haute workers have distinguished themselves by working for three years – over 2 1/2 million hours – without a lost time accident. Since Commercial Solvents Corporation was acquired by IMC in 1975, the company has placed a great deal of emphasis on safety, says Bob Urban, Director of Operations.

The research and development staff have also distinguished themselves in community service activities, helping to bring science to the community and the classroom in Terre Haute.

Among many other activities, the Terre Haute research staff sponsors an annual National Chemistry Week display in the local shopping mall and brings science demonstrations to the local schools.

COPY PREPARED BY

CB&S
CHRISTENSON, BARCLAY & SHAW, INC.

Client
Date Job No
Comm. No. Approved
Length
Eff.
For

– Pending approval of Bob Urban in Terre Haute –

LISA – please get a copy of The Spirit that had the history of the MSG bldg – blood expander for Korean War.

Ph. 341-0030

PM5 - 1 of 5
Pitman-Moore newsletter
Terre Haute plant feature
Headline: Terre Haute plant still pioneers production
Photos: 1) penicillin product photo, and 2) aerial plant photo
Cutlines: Commercial Solvents Corporation penicillin was a major contributor to the U.S. victory in World War II.
From its beginnings as a whiskey distillery at the turn of the century, the Terre Haute plant has grown to include xx acres and xx buildings on ~~two~~ three sites.

572 63

TERRE HAUTE, Ind. – Along the banks of the fabled Wabash River in this western Indiana town stands a plant that pioneered the use of biological processes for the production of industrial and pharmaceutical products.

In 1918 the Terre Haute plant of Pitman-Moore, Inc., then known as the Commercial Solvents Corporation, pioneered the production of acetone – a solvent used to make cordite for British Navy shells in World War I – through the fermentation of grain starch.

Company history has it that at the outbreak of World War I, a desperate shortage of acetone developed in Great Britain. Acetone was made at the time by the distillation of wood that had to be dried for six months. It was urgently needed not only to make cordite, but also as a solvent for nitrocellulose dopes used in finishing airplanes.

A frantic search was launched for a quicker process to make acetone, which lead to an English university, where a Russian-born chemistry professor, Dr. Chaim Weizmann, was making butyl alcohol – and acetone as a by-product – for an attempted synthesis of rubber.

digress - Jewish homeland is not related to TeH plant

Dr. Weizmann later developed a more efficient grain-feeding bacterium, *Clostridium acetobutylicum Weizmann*, which produced the required acetone at an unprecedented rate. The British government quickly adopted the process and started production at plants around the world. Dr. Weizmann refused personal honors from the British government, but asked for official aid for the Zionist cause, or the creation of a Jewish homeland in the Middle East.

delete!

Since Britain governed Palestine at the time, an important milestone in the creation of Israel would be the British government's recognition of the Zionist cause. The consequence of Dr. Weizmann's contribution to the Allied war cause, so the company history goes, was the famous Balfour Declaration of 1917, which called for "the establishment in Palestine of a national home for the Jewish people..."

After the United States entered World War I, the U.S. Air Service and the British War Mission purchased a whiskey distillery on the Wabash in Terre Haute and adapted it for production by the Weizmann process, and so was born the Commercial Solvents Corporation of New York (for a further fascinating history of Commercial Solvents Corporation see *Fortune* magazine, October 1944, page 135).

So began the company's proud history as a pioneer in the biological production of industrial and pharmaceutical products and as a contributor to the U.S. war effort.

Not to be outdone by its contribution in World War I, the Terre Haute plant made another major contribution in World War II when it pioneered the production of the "miracle drug" penicillin, an antibiotic that was credited with saving the lives of many wounded in the war, as well as those suffering from pneumonia, meningitis, gas gangrene as well as venereal diseases.

The Terre Haute penicillin plant was designed and built with a revolutionary "deep culture" process and placed in operation in less than six months in 1943. It had the capacity for *twice* the entire amount of penicillin produced in the U.S. that year through traditional surface culture methods.

In 1969 Commercial Solvents Corporation introduced a growth promotant implant for use in cattle based on a compound extracted from a naturally occurring corn mold. From its humble origins it quickly became the number one implant in the cattle business and remains today the most successful growth promotant ever offered – Ralgro®.

And the Terre Haute plant remains in the forefront of technology today with the completion of its $50 million PST (porcine somatotropin, or pork growth promotant) plant, which promises to be a revolutionary, recombinant DNA product used to produce lean pork.

Today the plant employs 368 people in a major Pitman-Moore production facility and in worldwide Pitman-Moore research and development headquarters. In addition to Ralgro, the plant produces Baciferm®, feed antibiotic for swine and poultry, contract chemicals for other companies, and is gearing up to produce Clinacox®, a poultry feed ~~antibiotic~~ produced under license from a Belgian company.

NO

coccidiostat
(prevents coccidiosis)

Terre Haute workers have distinguished themselves by working for three years – over 2 1/2 million hours – without a lost time accident. Since Commercial Solvents Corporation was acquired by IMC in 1975, the company has placed a great deal of emphasis on safety, says Bob Urban, Director of Operations.

The research and development staff have also distinguished themselves in community service activities, helping to bring science to the community and the classroom in Terre Haute.

* The Terre Haute research staff sponsors an annual National Chemistry Week display in the local shopping mall and brings science demonstrations to the local schools.

* this is just one example of R&D's community involvement. Is it better to be non-specific rather than imply this is R&D's only community activity?